ICD

CQ

April 1967
75¢

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- The "OMNIVERTER" Part III See page 65.
- Skin Effect-What Is It? See page 34.
- Narrow Band-Part II See page 46.

WFLD-TV

Amateurs Star on Chicago TV!
See page 62.

The Radio Amateur's Journal

COLLINS
130
120
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Very Selective

In fact, the Collins 75S-3B Receiver now has the sharpest selectivity available in a ham receiver. Improved cross-modulation characteristics immunize it to nearby transmitters. CW DXers using the 75S-3B easily dig that one signal from a pileup. Mechanical filter options provide just the right degree of selectivity for operating conditions in SSB, CW, or RTTY. Have you tried the 75S-3B lately? See your Collins distributor.

For further information check number 44 on pag

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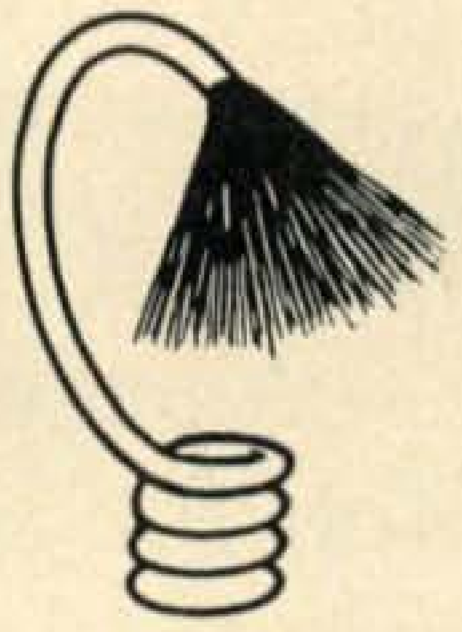

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For further information, check number 40, on page 110

See us—and the SR-2000—at the SSB Amateur Radio Show Mar. 21, Statler-Hilton Hotel, New York!

Please do not write for this 25,000-word free book unless you are really interested. It's pretty expensive.

OPERATING AND
SERVICE INSTRUCTIONS
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MODEL SR-2000
COMMUNICATIONS
TRANSCEIVER

SR-2000 transceiver specifications in brief:

Maximum legal input in a 26-lb. box no bigger than an overnight bag! **Special features:** Receiver Offset Control (RIT) permits ±2 kc adjustment of receiver frequency, independent of transmitter, for round-table, net or CW operation. Amplified Automatic Level Control. **Frequency Coverage:** 80, 40, 20, 15 and 10 meters. Upper, lower sideband, CW. All crystals provided for 28.0 to 30.0 mcs. **General:** Dial cal., 1 kc. Linear gear drive with less than 1 kc readout. Adjustable IF noise blanker. Provision for plug-in external VFO/DX adapter. Built-in VOX, break-in CW and PTT. Built-in CW sidetone. Hi-Lo power switch for SSB.* 2.1 kc 6-pole crystal lattice filter. S-meter-RFO-AALC and final screen metering.* Two-speed blower. 100 kc crystal cal. VFO covers 500 kc. **Transmitter Section:** Two 8122 output tubes. Variable Pi network. Power input, 2000 watts P.E.P. SSB; 1000 watts CW. Carrier and unwanted SB suppression, 50 db; distortion products, 30 db. Audio: 500-2600 cps @ 6 db. **Receiver Section:** Sensitivity less than 1 μv for 20 db S/N. Audio output, 2 W.; overall gain, 1 μv for ½ W. output. **Price:** $995. amateur net. P-2000AC Power supply, $395.

*Meters for final plate current and voltage built into P-2000AC power supply. Also Hi-Lo power switch, and loud speaker.

hallicrafters

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5th & Kostner Aves., Chicago, Illinois 60624

Export: International Division; Canada, Gould Sales Co.

For further information, check number 13, on page 110

CQ

APRIL 1967 VOL. 23, No. 4

The Radio Amateur's Journal

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EIMAC vapor-cooled high-linearity tetrode powers unique new 2000 watt PEP linear amplifier

The unique new linear amplifier shown here is powered by an EIMAC 4CV1500B tetrode. The ultimate in amateur equipment, this fine linear was designed by Jack Quinn, W6MJG, and uses the advanced concept of vapor-phase cooling for ultra-quiet operation. The amplifier runs cooler than most forced-air-cooled amplifiers, and because there is no extraneous noise from air blowers, your shack is quiet—ideal for receiving weak DX signals! On CW, the amplifier has an average input of 1 kW, with only 400 watts of plate dissipation at 60% efficiency.

High SSB performance of the amplifier is credited to the 4CV1500B's outstanding intermodulation distortion characteristics...better than −40 db third-order products at all drive power levels from zero to 2 kW PEP. The 4CV1500B—and its air-cooled brother, the 4CX1500B—are products of a four-year development study which included optimization of internal tube geometry by computer techniques. Because the tube has very low grid interception (typically less than 1.5 mA grid current) it is possible to drive the grid positive without adverse effects upon the distortion level of the driver. Both tubes are recommended for Class AB_2 linear amplifier service. For further information on advanced EIMAC power tubes, write Amateur Services Department or contact your nearest EIMAC distributor.

4CV1500B
TYPICAL OPERATION (Frequencies below 30 MHz)

DC Plate Voltage	2500	2750	2900	V
DC Screen Voltage	225	225	225	V
DC Grid Voltage	−34	−34	−34	V
Zero-Signal DC Plate Current	300	300	300	mA
Single-Tone DC Plate Current	720	710	755	mA
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3rd Order	−38	−40	−43	db
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We have a new brochure entitled "Linear Amplifier and Single Sideband Service." Write for your copy.

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4CV1500B LINEAR
VAPOR PHASE COOLED
PLATE VOLTAGE
PLATE CURRENT

For further information, check number 12, on page 110

ZERO BIAS

Recent action by the ARRL's Awards Committee finds us slightly baffled and very dissappointed. The action we refer to is the League's suspension of DXCC credit for six DXpedition operations by Don Miller, W9WNV, *and* the suspension of credit for all future Miller expeditions pending investigation of various charges against him. The action stems from several complaints made against Don of improper operating practices, improper and allegedly fraudulent QSLing practices, and lack of legal and proper permission to land and conduct amateur operations at certain island locations.

Now, we have a great deal of respect for the fellows at ARRL who represent our leadership. They're probably the greatest group of "professional amateurs" anywhere in the world; the most knowledgeable—and generally the best informed. We say this to support our belief that if ARRL is willing to risk the wrath of the DX world—as we once did—they probably have assembled a nearly air-tight case in support of their action. However, we must also say a word on behalf of Don Miller, W9WNV.

We've tangled with Don over his operating tactics. We lost that scrap.

Our conversation with Don showed that he is a man of very firm conviction. He has a very definite opinion of where his responsibility to the DX world lies, and having established that opinion, he lives up to it to the best of his ability, which is to say, a great deal. I don't agree with Don's methods, but then, consensus plays no part in his operations. As he once said, "We are not running a popularity contest."

We feel that if any part of the case of ARRL against Don is based on his controversial operating practices, they had best write that part off as a loss. All public opinion aside, the man has a right to his own beliefs—even if they offend some folks.

We also took issue with Don over his—or rather the World Radio Propagation Study Association's—practices in issuing QSL cards. The suggestion was made that it was possible to obtain a QSL from the WRPSA without having actually worked Don from a given location. We were confident that we could support such a suggestion—confidence based on promises of first-hand experience to be related if necessary. So armed, we proceeded to the field of battle, only to find ourselves stripped of our ammunition a piece at a time. Fellows who had "sent us to do battle" suddenly lost their voices, leaving us with no choice but to publicly apologize to Don for implying wrong-doing on his part—an apology we don't regret. Later developments further backed up Don's cry of innocent.

Again, we have a great deal of confidence in ARRL, but on this point, too, we think they *may* be in for rough sledding.

Probably the most questionable point in ARRL's entire indictment is the discreditation of *all future operations* by W9WNV and the WRPSA pending investigation of the present charges of lack of valid permission to land and operate from certain islands. The right of ARRL to discredit certain discreet operations for valid reason can't be disputed. *CQ* did just that last year for two of Don's operations: Spratly Island and Carmoran Reef.

But for ARRL to arbitrarily discredit operations—legal DX operations—*before* these operations have in fact taken place, is as high-handed and dictatorial an action as we can imagine. If a man has erred, try him for that error, but don't try him for "crimes" yet uncommitted! If, out of the countries from which Don has operated, ARRL questions the validity of only six, is it fair and just to judge the validity of his future operations using only these six as evidence? What of the others? Don't *they* bear *any* weight?

We feel that the motives of ARRL in this situation are completely above board. No interest is served by an unfounded attack on Don Miller and his operations, and we know the fellows at ARRL understand this. Don has done as much for the excitement and glamor of amateur radio as any one man ever will—Gus Browning included. I'm quite sure ARRL doesn't intend to "reward" him by unreasoned attack. Their motives, as we said, are surely above board, but as we've also said before in other situations, their method leaves much to be desired.

It is the opinion of *CQ* that ARRL's Awards Committee has unwittingly overstepped the limits of necessary and desirable action in this situation. Regardless of the eventual disposition of the charges now pending against Don's operations, this pre-judgment of future actions will stand as another small monument to the occasionally poor judgment at ARRL.

73, Dick, K2MGA

OUR READERS SAY

No Excuse for No QSL

Editor, *CQ:*

In December '66 *CQ* page 91; I read a letter from WA0LHR about the high cost of QSLing.

Let me tell you about QSL'ing in my country, Argentina (LU); perhaps this may be useful.

We have here a special postage rate for QSL's, considered as "General Interest" by our Postal Offices. So, sending a QSL here or to DX countries cost only 0,50 peso (that means about 0.001 dollars!; we can send nearly *1000 QSL's* for $1 U.S.! With this we *must* be good at QSL'ing!!

Jorge Lentino, M.D., LU2AJL/LU9DDZ
Buenos Aires, Argentina

Set The Record Straight

Editor, *CQ:*

Judging by what I hear on the air, a certain magazine editor has been fantastically successful in promoting the belief that *CQ* does not pay its writers promptly or at a competitive rate.

As an author of more than 20 *CQ* articles, I find myself unable to confirm his accusations. In all honesty I should mention that there was one occasion when I was not promptly paid for an article published in *CQ*. It occurred when Wayne Green was editor. Payment was finally received about a year later when another editor took over. Except for that one incident, however, payment has been prompt, courteous, and at least as generous as the rate *73 Magazine* has been touting.

On the other hand, I've submitted only one article to *73 Magazine* which was neither published nor returned, even though I requested return in the accompanying letter. In fact, receipt of that article was never even acknowledged.

Possibly these personal experiences will help set the record straight.

Frederick W. Brown, W6HPH
Idyllwild, California

The O.T.'s Speak

Editor, *CQ:*

I have enjoyed reading W6BLZ's articles on old times. I am 75 years old, and old enough to remember the old spark days. Don't build much but enjoy reading articles in your magazine.

Hope you will print more old history articles by Ed Marriner, which are very interesting as well as instructive.

Harry E. Mason
Hesperia, California

Editor, *CQ:*

Just finished reading "Wireless Before 1900" for the second time, and it is a very interesting article. Would enjoy reading more articles along the same line.

I was very much interested in wireless in 1909, and built a station at Madisonville, Ohio. Used my initials RSD for call, had about ¼" spark—only worked one station twice, about five miles away. Still have some of the old parts around here yet and am mentioned in First Re-Licensed Amateurs Listed in *Wireless Blue Book* of Wireless Association of America—years 1909, 1910, 1911.

I have been a subscriber to *CQ* from Vol. 1—#1, January 1945.

Thanks and let's have some more articles—my present call is W6PNJ—(1935).

Robert S. Dewire
Alhambra, California

"Our Readers Say" welcomes letters about nearly anything of interest to amateurs, whether about *CQ* itself, the state of the hobby, or whatever else you have on your mind. The most interesting letters will be selected for publication each month; just keep them legible, keep them short, and above all, keep them clean! Something bothering you. We're not mind readers, OM, so drop us a line.

To Contest Or Not To Contest

Editor, *CQ:*

In December issue of *CQ* there was a letter from K8IQB and WA8QQM as Contest Objectors.

This same old argument has been going on, on this side of the "pond" as well. Hams complain about contests and call them that enter "nuts", "fat heads", "silly report seekers". I don't call them any of these. These people get enjoyment out of contests. Some of them are ragchewers, like myself, but I also like a contest. Why must someone complain about someone else's pleasure. If they don't want to enter then there is always that switch on the gear. Surely they don't want to ragchew 365 days a year. Is it too much to forfeit one or two days of ragchewing when a contest is on? I only know of one contest when the bands are crowded and impossible to ragchew and that is *CQ* WW DX Contest. If I don't enter the *CQ* WW or any other contest for that matter, I don't try to ragchew; I give some of the boys a few points. When I have had enough I switch off and watch TV with the XYL or do a few jobs in the shack. Contests are fun and I think that contests make a good operator. There is also the DX which appears on the band. I have WAS but never had QSL cards back from some so I couldn't claim WAS. But in *CQ* WW contest I worked a lot of stateside stations and the QSL's are coming in from the states which I needed confirming. Remarks on QSL's like "first G ever," "first G on 28 mc." So where are the ragchewers? What are they doing?

I am not a DX fiend, but like to have a chat with a rare piece of DX and in the contest I picked up five new countries making a total of 180 worked. So much for what one can get out of a contest.

These arguments of c.w. vs. fone, QSL vs. non QSL, homebrew vs. commercial, etc. will be with us forever. It wouldn't do for us all to think and do the same. It's entirely up to the individual to voice his or her expression. So let's not condemn someone for doing something that one does not like doing oneself.

George Francis, G3TWV
Farndon, Newerk Notts, England

A Note On MEMTAC

Editor, *CQ:*

I would like to take this opportunity to thank the many, many readers of *CQ* who wrote me following the publication in last April's *CQ* of my article "MEMTAC—A New Method of Communication." Although MEMTAC, a suggested technique for using the earth's magnetic field for long-distant communications, was still in the experimental stage, I published my article to stimulate discussion and thought among radio amateurs. I had no knowledge at the time that other organizations were investigating similar techniques.

Judging from the letters I received, my article achieved its goal. Nearly 200 hundred radio amateurs volunteered to assist me in carrying out additional experiments with MEMTAC. I would like to continue these experiments with the help of radio amateurs, but for reasons which I am unable to discuss at the present time, it is not possible for me to divulge any additional information about MEMTAC. Powerful forces are at work which may prevent MEMTAC from being utilized by radio amateurs as I had envisioned. I am very sorry about this, but I hope dear readers that you will understand the situation.

Jerzy Ostermond-Tor, Ex-YM4XR
Lauton Institute
c/o *CQ*, The Radio Amateur's Journal

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An Electronic Keyer Kit for $49.95
A Solid-State AC Power Supply Kit for $79.95

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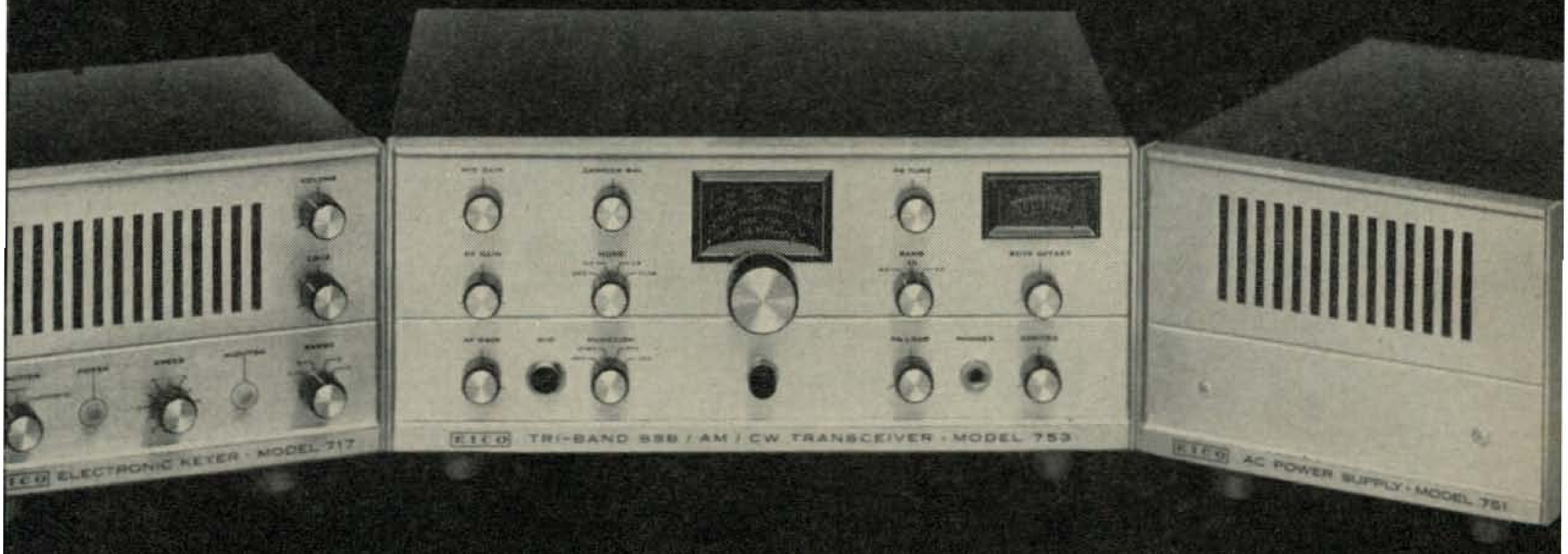
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Who else but EICO

***Pro* all the way, from concept to execution — that's what ham editors say about EICO. Critical customers agree, and like the low price, too. They've made the 753 kit, for example, the industry's hottest seller. And the new 717 Keyer seems headed for the same fate. Highlights of both give you some inkling why:**

The EICO 753 is a complete 3-band transceiver, offering SSB/AM/CW operation with conservatively rated 200 watts PEP on all modes (rated for maximum efficiency rather than maximum possible input power). A new Silicon Solid State VFO provides full coverage of the 80, 40, and 20 meter bands. Assembly is made faster and easier by VFO and IF circuit boards, plus pre-assembled crystal lattice filter. Rigid construction, compact size, and superb styling make this rig equally suited for mobile and fixed station use. The EICO 753 is at your dealer now, in kit form and factory-wired.

FEATURES: High level dynamic ALC prevents flat-topping even with extreme over-modulation. Automatic carrier level adjustment on CW & AM. Receiver offset tuning (10 kc bandspread) without altering transmit frequency. Front panel selected STANDBY, VOX, or P-T-T operation. Unique ball drive provides both 6:1 rapid band tuning and 30:1 vernier bandspread with single knob. The Model 753 is an outstanding value **factory wired at $299.95**

EICO Model 751 AC Supply/Speaker Console: Provides all necessary operating voltages for Model 753. Incorporates PM Speaker, conservatively rated components and silicon rectifiers for minimum heat and extended trouble-free life. Includes interconnecting plug-in cables. **Kit $79.95 Wired $109.95**

SPECIFICATIONS: Output Voltages: 750 volts DC at 300ma, 250 volts DC at 170ma — 100 volts DC at 5ma, 12.6 volts AC at 4 amps. INPUT VOLTAGE: 117VAC.

EICO Model 752 Solid State Mobile Power Supply: (Not Shown). For use with 12 volt positive or negative ground systems. Full protected against polarity reversal or overload. Output voltages identical to Model 751. Input voltage 11-14 volts DC.
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For FREE catalog and Amateur Radio brochure write to EICO 131-01 39th Ave.,
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EICO

For further information, check number 11, on page 110

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No strings—no backlash. The pointer is driven by a flexible toothed rack riding in an extruded aluminum channel. Illuminated slide rule dial with 11.1 ratio. Scale length 6½". For behind panel mount. $11.45.

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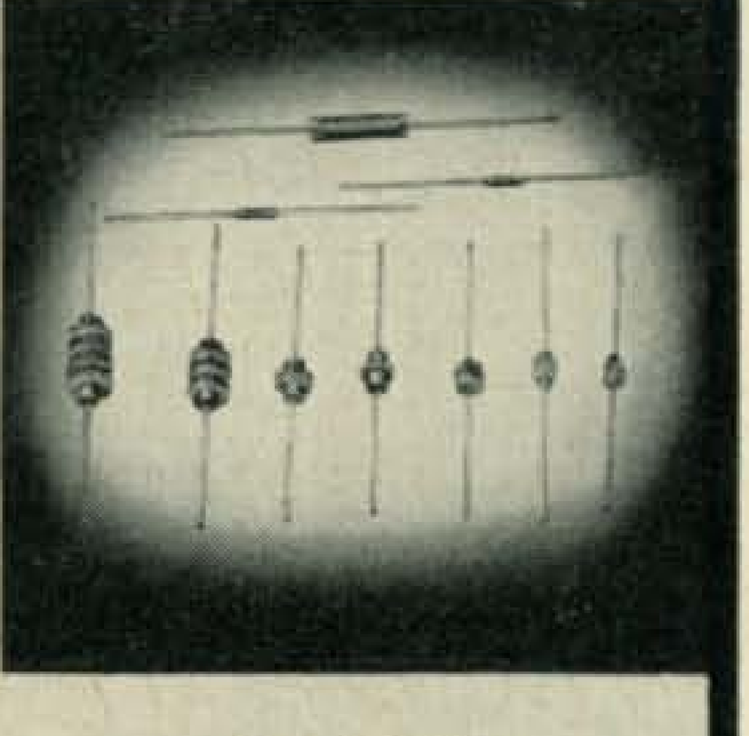
SIX Meters	J300-8.2	.56
6/10 Meters	34300-22	.43
TEN Meters	J300-25	.64
10/15 Meters	34300-68	.43
10/15/20 Meters	34300-50	.43
20 Meters	34300-100	.43
40/20 Meters	34300-500	.43
80 Meters	J300-360	.73
80/40 Meters	34300-1000	.43
160 Meters	J300-1200	.73
LOW FREQ.	J300-1500	.73
ALL BAND	34300-2500	.43



No. 25000
CAPACITORS

Millen No.	Capacity	Price
25009-E	1.6 - 9.3 pf	$1.66
25012-E	1.9 - 12.8 pf	1.73
25015-E	2.4 - 15.7 pf	1.76
25025-E	3.2 - 25.2 pf	2.06
25035-E	4.4 - 35.0 pf	2.23
25009-S	1.6 - 9.3 pf	1.26
25012-S	1.9 - 12.8 pf	1.33
25015-S	2.2 - 15.7 pf	1.36
25025-S	3.0 - 25.5 pf	1.66
25035-S	4.0 - 35.8 pf	1.83
25009-T	1.6 - 9.3 pf	1.26
25012-T	1.9 - 12.8 pf	1.33
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For further information, check number 4, on page 110

Feenix, Ariz.

Deer Hon. Ed:

Scratchi have most serious subject to bringing to your attenshun. It are time for a revolushin in one aspect of amchoor radio. And, on acct. I liking you, I bringing it to your attenshun first. If Hon. Seek-You magazine making issue of it, you being big hero in eyes of publisher.

I referring to the out-of-date custom of exchanging QSL cards. In this modern day and age it not making sense that we amchoors are sticking stamps on pieces of cardboard and sending them to sumbuddy we just talking to at speed of light.

It was okey back in days when having arc xmitters and making reseevers with coils wound round Hon. Oatmeal box. After all, who would buleeving you being able to talking to another wireless nut all away across town. Howsumever, in these days of computers and saddlelites, there ought to being better way than sending QSL cards through mail.

Let's analyzing sityouashun reel careful-like. Why are amchoor wanting to get QSL cards? To papering wall with? No, Hon. Ed., I can't buleeving that. These days the XYL are hitting the OM on the head with a broom if he using sticky tape to mounting QSL cards on the wallpaper in the shack.

Not only that, but QSL cards are reel expensive wallpaper. I are conducting survey and finding out that it costing four bux per square foot to wallpapering wall with QSL cards (including international reply coupons). For four bux per square foot you can putting gold leaf on walls. Okey, so amchoors not wanting QSL cards for wall. What else?

You thinking maybe amchoors wanting QSL cards because they collecting stamps? After all, those QSL cards from foreign countries having some reel pretty stamps on them. Well, if that is the reason, most amchoors are pretty stoopid, on acct. they can go to neerest five and dime and getting packet of cupple hundred foreign stamps for two-bits.

So, if you can getting reel peechy stamp collectshun for cupple bux, why spending lotsa money to collecting stamps one at a time off QSL cards? No indeedly, that not the reason. Scratchi are forced to one last conclusion.

Amchoors wanting QSL cards just so he can prove to other peeples that he ackchewally working other stayshun. He knows he worked it. It's only because others not buleeving that he having to have QSL card. To convincing other peeples, and to getting certificates to hanging on wall, he needing QSL cards.

Hon. Ed., QSL cards aren't that big a deal for proving you having QSO with dee-x stayshun. For cupple hundred bux you can getting used printing press, setting up type and printing card with dee-x call on it. Then, all you having to do is filling in time and date and signal report and signing it "Cheerio, Reggie" or whatsumever. Of course, are good idea to knowing what Reggie's card reely looks like before you printing fake card, otherwise some contest editor are going to be a little sticky about hole thing.

So, if QSL card not reely proving you working rare dee-x, what's the point in having them? No, what amchoors are needing is sum reliable person standing next to them when they ackchewally working the rare dee-x stayshun. Of course, you not reely needing sumbuddy there, on acct. all you needing is to have a recording of the QSO.

When dee-x stayshun from Rattlesnake Island are coming back to you, just turning on tape recorder, and recording your call, call of dee-x stayshun and his report to you, and there you having reel proof of the contact, in the fist or voice of the dee-x stayshun!

That would be honest-to-goodness proof you reely working Rattlesnake Island. Who can disbuleeving tape recording? Hon. Ed., aren't that simpler than sending out QSL card, then sweating out long wate before Hon. Dee-X deciding to finely sending you his card?

Ok, Hon. Ed., now it are up to you. Scratchi having grate geenyus for ideas, but he not having powerful magazine he editing. So, pulling out your typewriter and making with editorial on doing away with QSL cards. Considering it are your patriotic duty. With big mess Hon. U.S. Postoffice in these days, think how much it will helping to having no QSL cards gumming up the males.

You can giving it sum fancy name like QSL-cording. The minute that amchoors knowing that 1/c magazine like Hon. Seek-You are behind idea, and that your contest editors will accepting QSL-cording as proof of contact, then hole idea will spreading like sixty.

If you deciding to put grate wate of your Hon. Magazine behind this idea, will you please letting me know how much it costing me to running this ad:

"Needing tape recorder for making your own QSL-cording? Complete tape meckanism reddy to build into control panel only $4.95 postpaid. Sending order to Hashafisti Scratchi, P.O. Box 73, Feenix, Ariz."

Howcums? Well, Hon. Uncle in Japan who running electronics factory having bunch of reject tape recorders, and he writing me I can buying them for cupple bux apiece. So, I can doing

[*Continued on page 97*]

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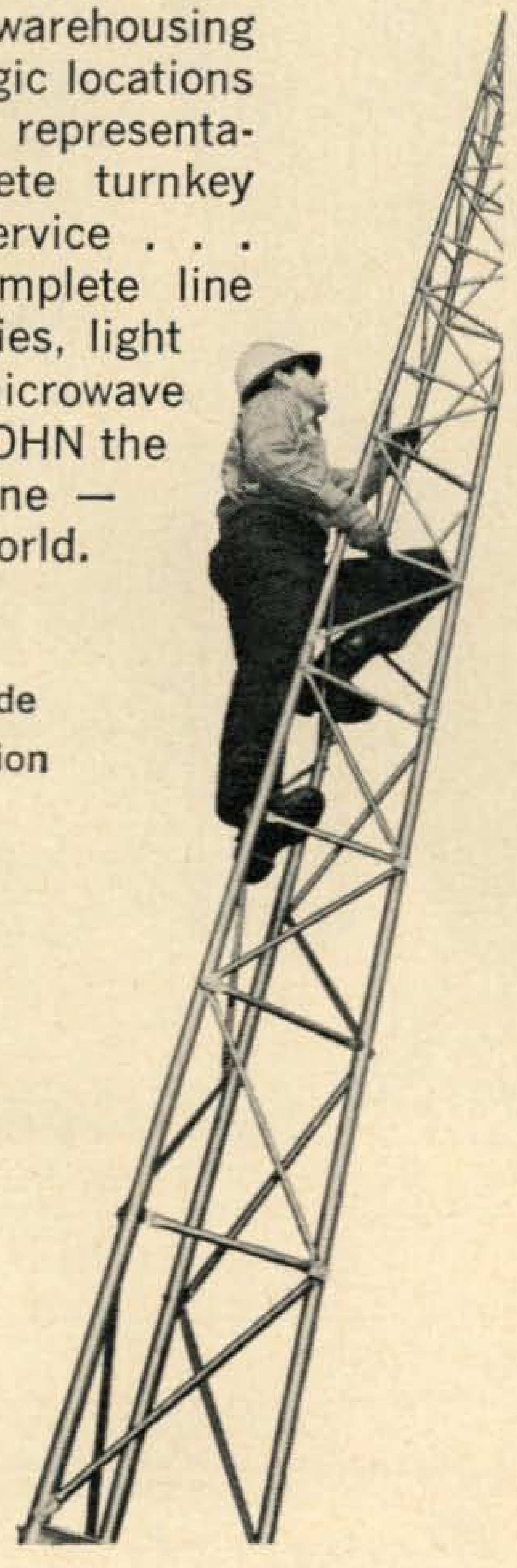

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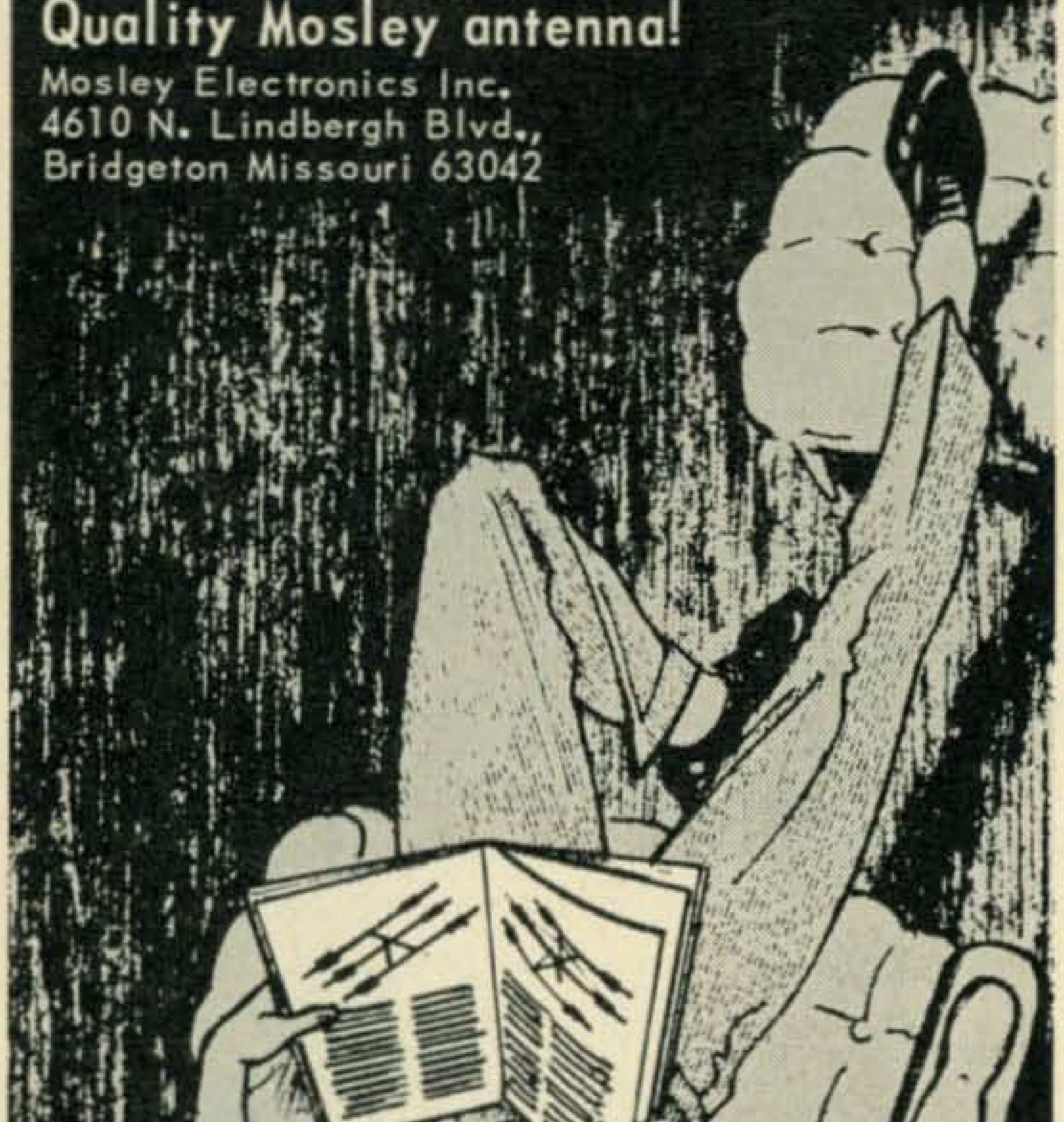

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Announcements

LCL Anniversary Party

The Loaded Clothes Line YL Net plans a 10th Anniversary Party for 24 hours beginning at 1700 GMT on April 3rd. A special certificate will be awarded to those making contacts with three LCL members in good standing. The following are suggested meeting times when the gals plan to be on: 1700 GMT, 7235 kc.; 1900, 3895; 2100, 14,265; 2200, 21,350; 0200, lower part of 75 meter band. Copies of logs should be sent to Helen Drake, K5ECP, 1717 Virginia NE, Albuquerque, N.M. for the award.

L.I. Club Meeting

All mobile amateurs are invited to attend a meeting of Long Island Mobile Amateurs Radio Club. Special feature will be a presentation by David Walker, W8FKI, Service Editor, Automotive Technical Services—Champion Spark Plug Company. Topic, "Interference to Two Way Radio." The meeting will be at 8:00 P.M. Tuesday, April 4 at Sterling Bowling Lanes, 1350 Union Turnpike, North New Hyde Park, Long Island, New York, opposite Sperry Gyroscope.

Dayton, Ohio

The 16th annual Dayton Hamvention will be on Saturday, April 15, 1967. Generally over 2500 hams show up for this big annual event and it promises to be a big one this year. The Hamvention will be at the Wamplers Ballarena in Dayton again this year. For complete information rush a card to Dayton Hamvention, Dept. M, Box 44, Dayton, Ohio, 45401.

Rockaway Beach, N.Y.

The Rockaway Amateur Radio Club will hold a "Rockaway On The Air" day on two meters, Sunday, April 2, from 1200 to 1800 EST. The purpose is to allow radio amateurs to contact five or more Rockaway ARC members and thus qualify for the club award. Send a copy of the log to Rockaway ARC, P.O. Box 205, Rockaway Park, N.Y. 11694.

The Rockaway Amateur Radio Club Spring Auction will take place Friday evening, April 14th, at 8 P.M. at the American Irish Hall on Beach Channel Drive (at Beach 81st St.) in Rockaway Beach. Doors open at 6 P.M. for items to sell. One dollar donation at door.

Syracuse, N.Y.

R.A.G.S. presents its annual Central New York Hamfest on Saturday, April 8, 1 til 9 P.M., at the crossroads of N.Y. State, Northway Inn, intersection of Interstate Rte. 81 and N.Y.S. Thruway Exit 36. Stuart Meyer, W2GHK, ex-president of Hammarlund, now associated with AMECO, will present his latest DXpedition show. On-the-air Ham TV demonstrations will be given, as well as other activities. Full course roast beef banquet completes the day's activities. Capacity is limited, so please pre-register. $5.75 covers registration, banquet, etc. Mail checks payable to Radio Amateurs of Greater Syracuse, P.O. Box 88, Liverpool, New York 13088, or contact Ticket Chairman Norm Esterson, W2YRL.

Johnson City, N.Y.

The Southern Tier Radio Clubs will be holding their eighth annual dinner and hamfest on Saturday, April 15, 1967 at St. John's Memorial Center in Johnson City. Tickets and reservations are available from John Bull, wwl Oscar Terrace, West Corners, Endicott, or Joe Kuntz, 4852 Marshal Drive, Endwell, N.Y. Tickets are: $4.00 for adults and $2.00 for children under 12. All reservations for tickets must be in by April 12, 1967. No tickets will be sold at the door. The doors will open at 5:00 P.M. and dinner will be served at 7:00 P.M. We will have a speaker, displays, and many door prizes in addition to the dinner.

[*Continued on page 96*]

A STAR IS BORN!
SWAN 500
SWAN 500
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5 BANDS—480 WATTS

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At the top of the Swan Line, the 500 offers many extra features: Selectable upper and lower sideband, 100 kc crystal calibrator, automatic noise limiter, provision for installation of an internal speaker (the best solution for the mobile installation), and a factory installed accessory socket for the addition of the model 410 external VFO.

As a receiver, the new 500 will satisfy the most critical operator. Sensitivity is better than .5 uv and the precision tuning mechanism is easily the smoothest you will find on any piece of amateur gear. Improved production techniques result in even better VFO stability. A new product detector circuit provides you with superior audio quality, and a new AGC system responds more smoothly to wide variations in signal strength.

The new 500 is equipped with the finest sideband filter used in any transceiver today. With a shape factor of 1.7, ultimate rejection better than 100 db, and a carefully selected bandwidth of 2.7 kc, this superior crystal filter combines good channel separation with the excellent audio quality for which Swan transceivers are so well known.

Frequency coverage of the five bands is complete: 3.5-4.0 mc, 7.0-7.5 mc, 13.85-14.35 mc, 21-21.5 mc, 28-29.7 mc. (In addition, the 500 covers Mars frequencies with the 405X accessory crystal oscillator.)

Along with higher power, improved styling and many deluxe features, the new 500 has the same high standards of performance, rugged reliability and craftsmanship that have become the trademark of the Swan Line. Backed up by a full year warranty and a service policy second to none, we feel that the Swan 500 will establish a new standard of value for the industry. Our new "Star" is now in production. **$495** amateur net.

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PLUG-IN VOX UNIT Model VX-1	**$ 35**

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SWAN

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For further information, check number 2, on page 110

The Companion—

A Homebrew Matching Receiver for the Heath SB-400 SSB Transmitter

BY LT. (J.G.) TIMOTHY P. HULICK,* W9MIJ/1

The following detailed construction project describes a homebrew transistorized receiver specifically designed to operate with the Heath SB-400 s.s.b. transmitter. Either independent transmit/receive or transceive operation may be selected. Certain circuits are switched from the SB-400 for use in the Companion, such as the conversion oscillators and the s.s.b. filter.

TRANSCEIVE operation has become extremely popular over the past few years with many commercially built transceivers available on the market. Those of us with nice modern s.s.b. transmitters that work well are hesitant about giving them up to go transceive because of the satisfaction received from them and the expense. The Heath SB-300 is, of course, the perfect mate to the SB-400 and no doubt a good combination on the air, but buying the pair of them became a bit out of my price range. So a Heath SB-400 with which I have been very satisfied was purchased about a year ago.

About six months ago it occurred to me to build a transistorized version of the Heath SB-300 and obtain the maximum enjoyment out of s.s.b. transceive operation. Being able to design the receiver with the good appearance and performance to match the SB-300 was thought to be quite a task. With much patience, a well supplied tool box, junk box, and the aid of a lathe, the project was very enjoyable and even more rewarding than anticipated. The finished product looks very much like the SB series, but is quite a bit smaller as can be seen in the pictures. Its dimensions are 7 × 7 × 13½ inches; it has 0.5 microvolt sensitivity, and no noticeable noise level, a 2.1 kc crystal filter and three watts of audio output. The receiver has, in addition, its own v.f.o. for separate transmit-receive operation calibrated to within 1 kc over the entire band on all bands. It sounds good for about $30.00

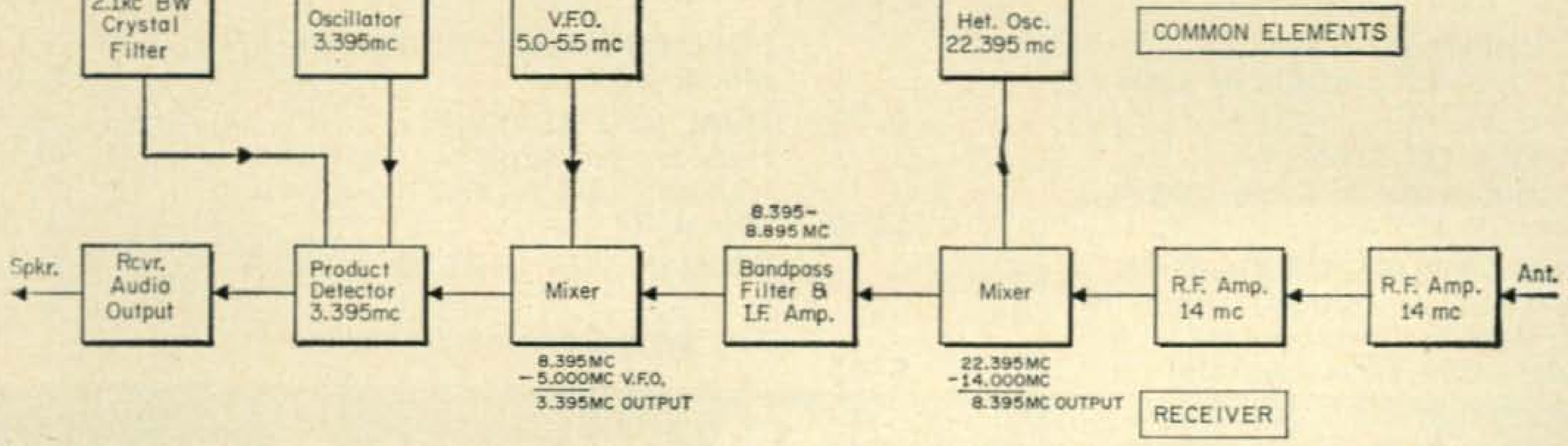
SB-400
Mic.
Xmtr. Audio Input
S.S.B. Generator 3.395mc
Mixer
8.395-8.895 MC
Bandpass Filter & I.F. Amp.
Mixer
Driver 14 mc
R.F. Amp. 14 mc
Ant.
3.395MC
+5.000MC V.F.O.
8.395MC OUTPUT
22.395MC
-8.395MC
14,000MC OUTPUT
2.1kc BW Crystal Filter
Oscillator 3.395mc
V.F.O. 5.0-5.5 mc
Het. Osc. 22.395 mc
COMMON ELEMENTS
Spkr.
Rcvr. Audio Output
Product Detector 3.395mc
Mixer
8.395-8.895 MC
Bandpass Filter & I.F. Amp.
Mixer
R.F. Amp. 14 mc
R.F. Amp. 14 mc
Ant.
8.395MC
-5.000MC V.F.O.
3.395MC OUTPUT
22.395MC
-14.000MC
8.395MC OUTPUT
RECEIVER

Fig. 1—Block diagram of the transceive operation for 20 meters shows the reverse correlation between the transmitter (top) and receiver (bottom).

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*30 Lynn Road, Brockton, Mass.

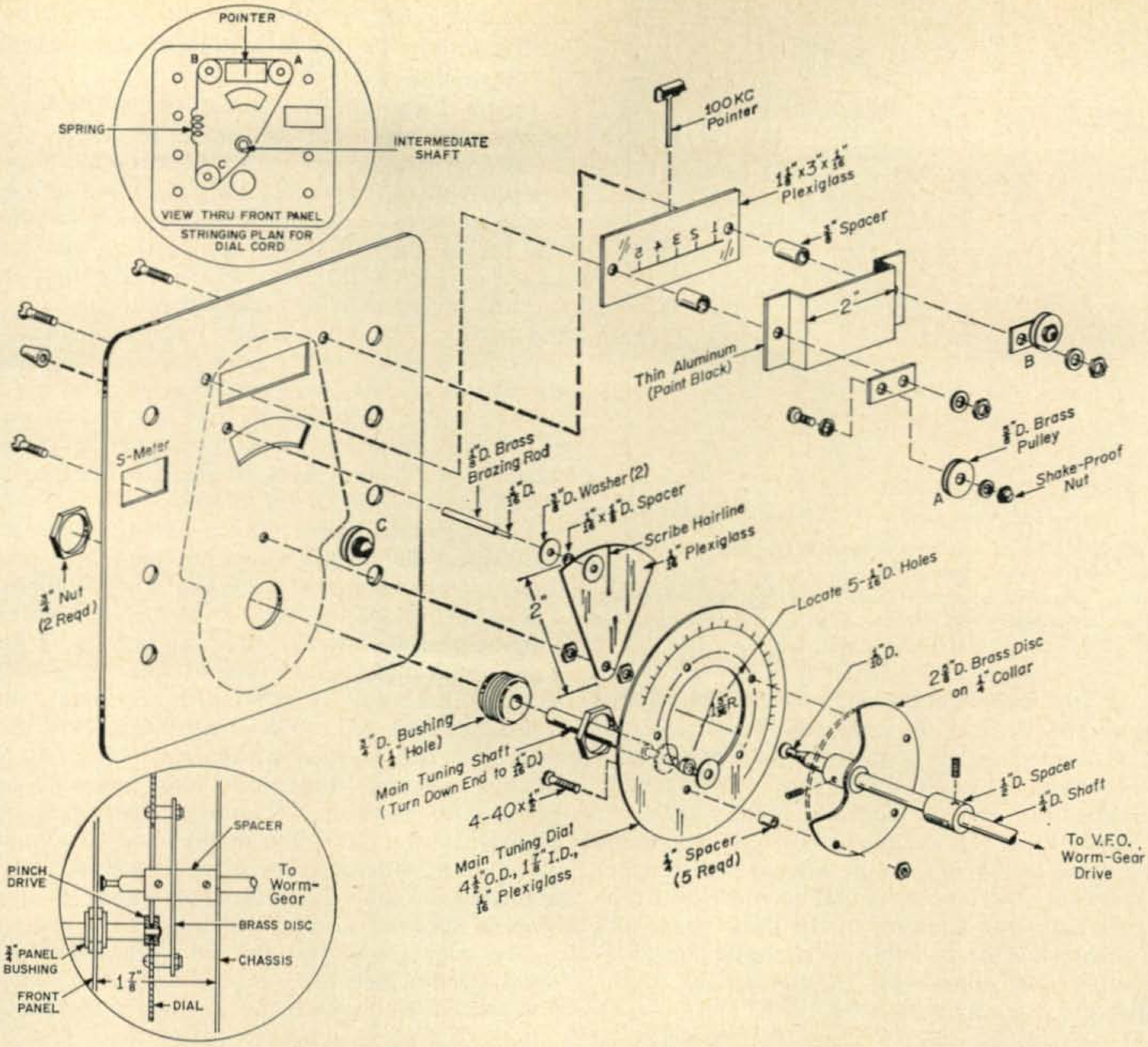

POINTER
B
A
SPRING
INTERMEDIATE SHAFT
C
VIEW THRU FRONT PANEL
STRINGING PLAN FOR DIAL CORD
100 KC Pointer
1 1/8" x 3" x 1/16" Plexiglass
3/8" Spacer
2"
Thin Aluminum (Paint Black)
B
3/8" D. Brass Pulley
A
Shake-Proof Nut
S-Meter
3/4" Nut (2 Reqd)
C
3/8" D. Brass Brazing Rod
1/16" D.
3/8" D. Washer (2)
1/16" x 3/8" D. Spacer
Scribe Hairline
1/16" Plexiglass
2"
Locate 5-1/16" D. Holes
1 5/8" R.
1/16" D.
2 3/8" D. Brass Disc on 1/4" Collar
3/4" D. Bushing (1/4" Hole)
Main Tuning Shaft (Turn Down End to 1/16" D.)
4-40 x 1/2"
Main Tuning Dial 4 1/2" O.D., 1 7/8" I.D., 1/16" Plexiglass
1/4" Spacer (5 Reqd)
1/2" D. Spacer
1/4" D. Shaft
To V.F.O. Worm-Gear Drive
SPACER
PINCH DRIVE
To Worm-Gear
BRASS DISC
3/4" PANEL BUSHING
CHASSIS
1 7/8"
FRONT PANEL
DIAL

Fig. 2—Construction details for the 100 kc dial and indicator. The pulleys are used to guide the dial cord. The hairline indicator for the round kilocycles dial is scribed onto a wedge-shaped strip of plastic. It can be moved around its pivot for minor corrections in frequency. Three turns of dial cord for the 100 kc indicator are wound on the turned down end of the main tuning shaft. The main tuning friction drive is made of a ¼" diameter, 1/16" thick washer placed between two thin steel ½" diameter washers with 1/16" holes in their centers. The general layout of the dial also shows dial cord stringing for the 100 kc indicator dial.

doesn't it? I might also add that the v.f.o. is rock stable.

Theory Of Transceive Operation

The theory of a receiver designed for transceive operation is quite simple. Think of your transmitter exactly in reverse and you have a receiver. There are no oscillators in the receiver except for its own v.f.o. which is not even used when transceiving. This is true because all of the oscillators are already contained in the SB-400. The receiver and transmitter will track together across the entire band on all bands because the frequency standards used are the same for both transmitter and receiver. This is best illustrated by the block diagram shown in fig. 1. All of the common elements illustrated in fig. 1 are already contained in the SB-400. Only cables need be fabricated to connect them to the receiver. The alterations that must be made to the SB-400 will be discussed later.

Dial Construction

If the builder is interested in operating transceive all of the time, then *he need not construct a v.f.o. for the receiver at all* and the entire dial mechanism can be omitted. I decided to build a separate v.f.o. for the receiver because I preferred to have the advantages of both transceive and separate transmit-receive capabilities. Most of the time used to build the receiver will be put into constructing the v.f.o. and its associated dial, so this will be covered first.

A lathe became a necessity in order to make my own pulleys, shafts, wheels and even all the knobs. Unless you have access to a lathe, it would be advisable to build the receiver without its own v.f.o. and operate transceive exclusively. When operating transceive the SB-400 dial is tuned and not the receiver. This is a bit of a change from the usual because normally tuning the receiver is common practice in transceive. It really makes no difference, however.

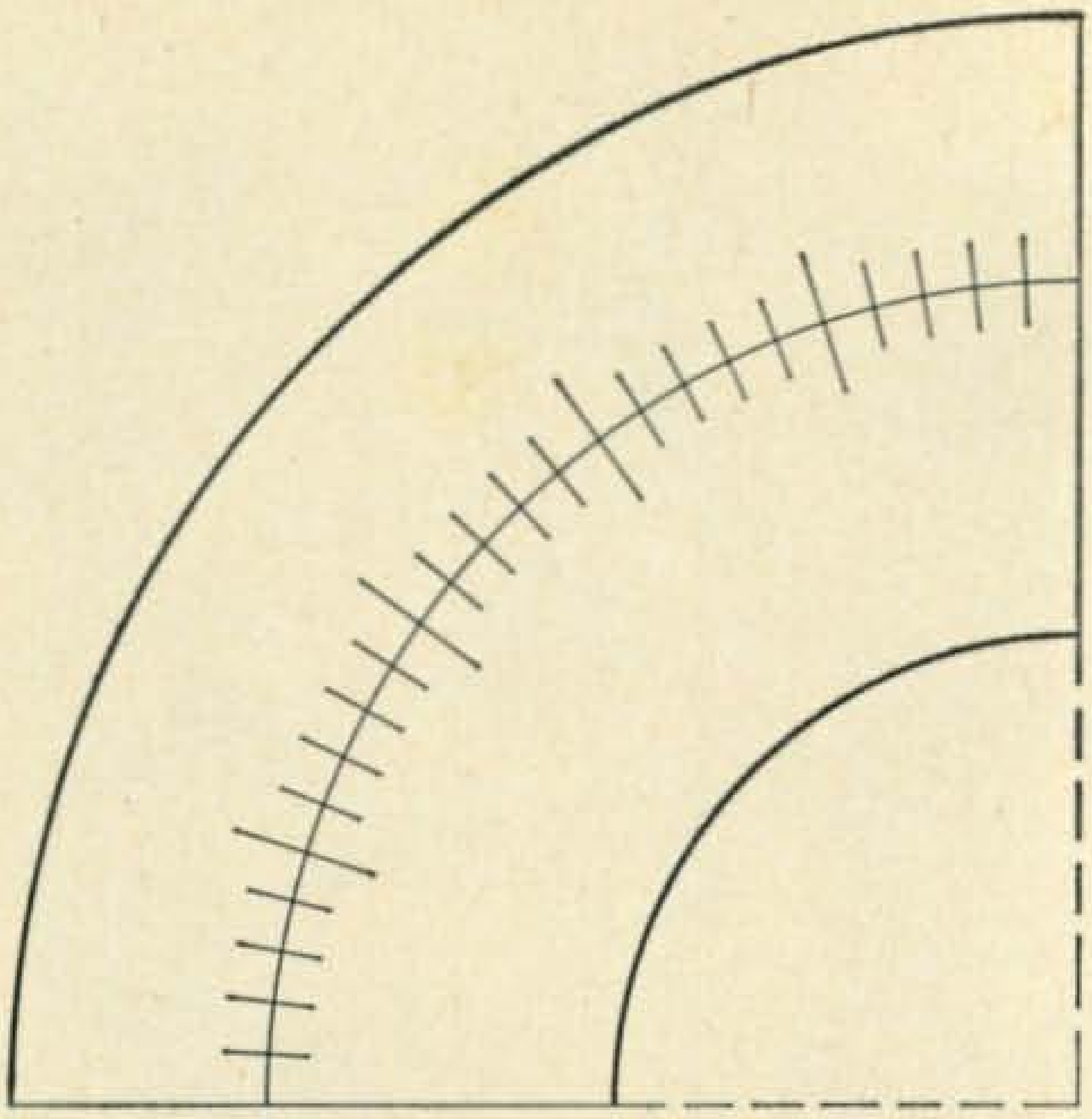


Fig. 3—Full-size scribing template for one quarter of the 100 kc dial. Template may be pivoted about its center point to complete scale markings for the entire dial. Numbers should be added accordingly, as described in the text.

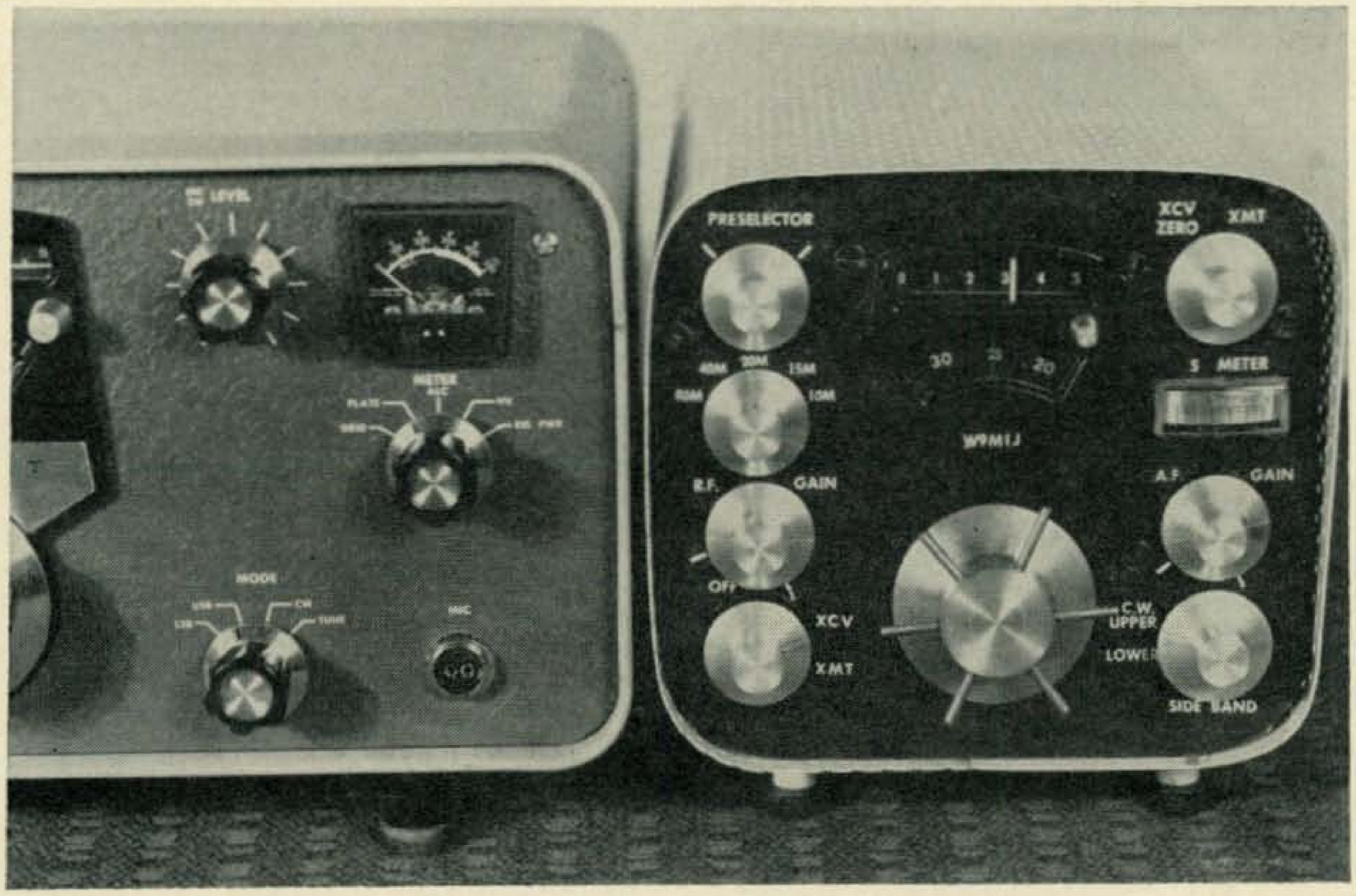
If you intend building the v.f.o. fig. 2 will be useful. As can be seen, this drawing represents a mechanism slightly similar to the dial mechanism in the SB-series, especially the main circular dial and the hair-line pointer dial.

The linear 100 kc marker dial is very much the same as the one in the SB-series equipment except that the pointer is dial cord driven which necessitates the addition of the three brass pulleys shown. One-sixteenth inch plastic sheet was used for the actual dial. It can be cut to the proper size easily with a hacksaw. The lines indicating the 100 kc points can be scratched on with a wire nail aided by a straight edge. Teknicals® were used for the numbers.

Figure 2 also shows a wedge shaped piece of plastic with a hole at its vertex. It can be cut to its approximate size with a hacksaw and then shaped with a rough file. This piece is used as the zero hair-line for the main 0-100 kc round dial as in the SB-400. The hair-line can be scratched on. A little drive wheel like that in the SB-series was constructed in order to move the hair-line plate for minor frequency corrections. Its dimensions are shown in fig. 2. After the two discs and small spacer are slipped onto the one-eighth inch brazing rod, the end of the rod is peened over like a rivet and the drive wheel is complete. Check to see if it fits snugly over the perimeter of the plastic.

For the main tuning dial, a one-quarter inch shaft must be turned down to one-tenth inch diameter at one end to look like a small spool. The dial cord for the 100 kc marker dial wraps around several times to drive the pointer. With a one-tenth inch diameter spool and the 100 kc markers three-eighths inch apart, the pointer will move one mark per 100 kc or per one dial revolution. The rest of the one-quarter inch shaft is made long enough to go through the main chassis to the v.f.o. variable capacitor mechanism to be discussed later. Since you may choose to mount your parts differently because of the unavailability of the exact parts used, no length for this shaft is specified.

The main round dial was cut from a sheet of one-sixteenth inch thick plastic with slow speed and very light pressure on a circle cutter in a



Front view shows the relative size of the transistorized receiver to the SB-400. The receiver feet are conventional rubber feet, the front two feet being made longer than the back two with ceramic stand-offs. Control designations are clearly visible. All knobs were made on a lathe including the main tuning knob which resembles a ship's helm. The panel can be painted the proper shades of green to match the SB-400. The case is perforated aluminum fashioned around the front panel.

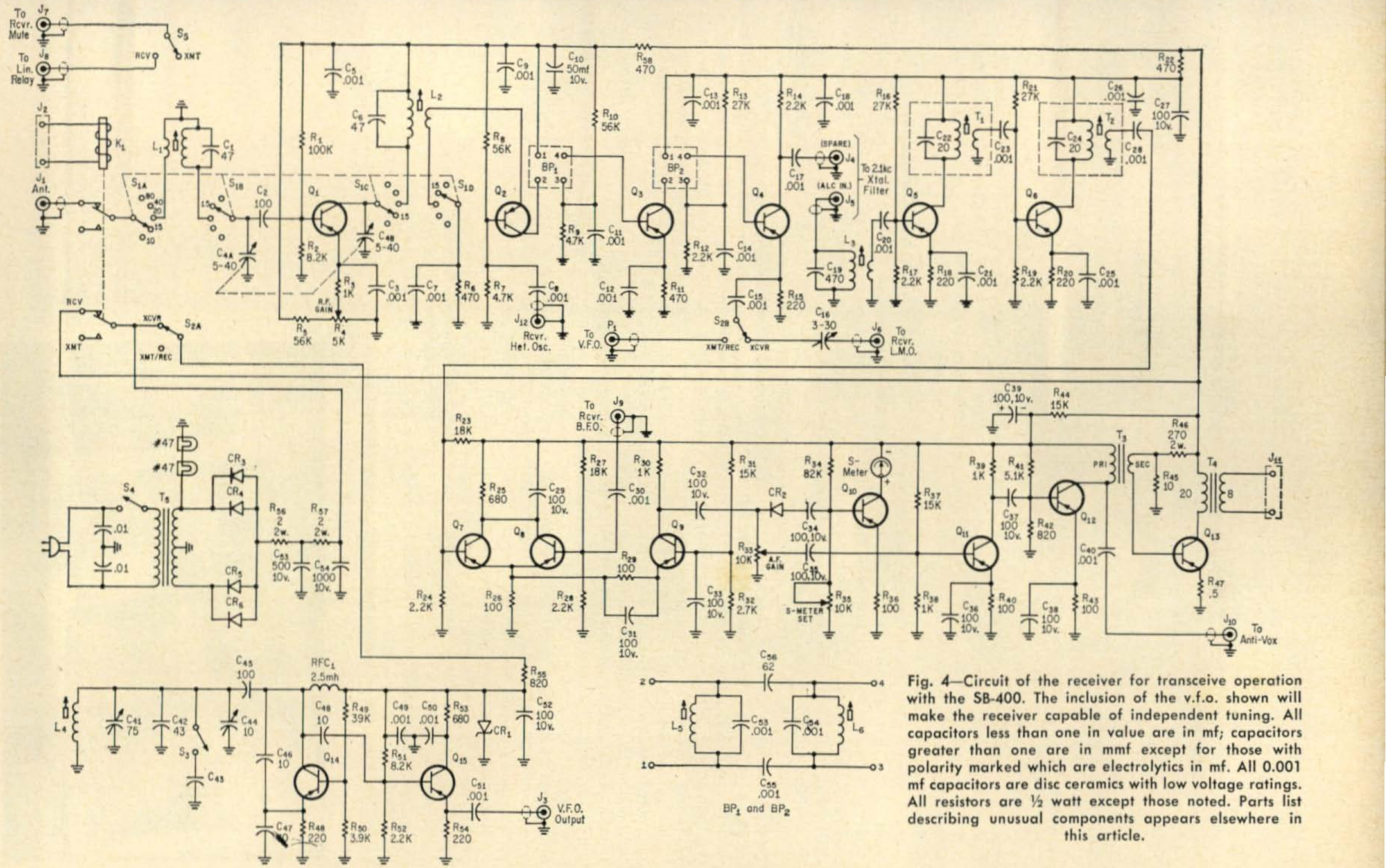

To Rcvr. Mute
J7
S5
RCV
XMT
To Lin. Relay
J8
J2
K1
J1 Ant.
L1
C1 47
S1A
S1B
C2 100
C4A 5-40
Q1
R1 100K
R2 8.2K
R3 1K
R.F. GAIN
R4 5K
R5 56K
C3 .001
C4B 5-40
C5 .001
C6 47
L2
S1C
S1D
C7 .001
R6 470
R7 4.7K
R8 56K
Q2
C8 .001
J12 Rcvr. Het. Osc.
C9 .001
C10 50mf 10v.
R58 470
R10 56K
BP1
R9 4.7K
C11 .001
BP2
Q3
C12 .001
R11 470
R12 2.2K
C13 .001
R13 27K
C14 .001
R14 2.2K
C18 .001
Q4
C15 .001
R15 220
(SPARE) J4
C17 .001
(ALC IN.) J5
To 2.1kc Xtal. Filter
C19 470
L3
S2B
C16 3-30
To V.F.O. P1
XMT/REC
XCVR
J6 To Rcvr. L.M.O.
R16 27K
C20 .001
Q5
R17 2.2K
R18 220
C21 .001
C22 20
T1
C23 .001
R21 27K
Q6
R19 2.2K
R20 220
C25 .001
C24 20
T2
C28 .001
C26 .001
R22 470
C27 100 10v.
RCV
XMT
XCVR
XMT/REC
S2A
#47
#47
S4
T5
.01
.01
CR3
CR4
CR5
CR6
R56 2 2w.
R57 2 2w.
C53 500 10v.
C54 1000 10v.
R23 18K
R24 2.2K
Q7
R25 680
Q8
C29 100 10v.
R26 100
To Rcvr. B.F.O.
J9
R27 18K
R28 2.2K
C30 .001
R30 1K
R29 100
C31 100 10v.
Q9
C32 100 10v.
C33 100 10v.
R31 15K
R32 2.7K
R33 10K
A.F. GAIN
CR2
C34 100,10v.
C35 100,10v.
R34 82K
S-Meter
Q10
S-METER SET
R35 10K
R36 100
R37 15K
R38 1K
Q11
C36 100 10v.
R39 1K
R40 100
C37 100 10v.
R41 5.1K
R42 820
C38 100 10v.
Q12
R43 100
C39 100,10v.
R44 15K
T3
PRI
SEC
R45 10
R46 270 2w.
T4
20
8
J11
Q13
R47 .5
C40 .001
J10 To Anti-Vox
C45 100
RFC1 2.5mh
R55 820
C52 100 10v.
L4
C41 75
C42 43
S3
C43
C44 10
C46 10
Q14
C47 100
R48 220
C48 10
R49 39K
R50 3.9K
C49 .001
C50 .001
R51 8.2K
R52 2.2K
Q15
R53 680
CR1
C51 .001
R54 220
J3 V.F.O. Output
C56 62
C53 .001
C54 .001
L5
L6
C55 .001
BP1 and BP2

Fig. 4—Circuit of the receiver for transceive operation with the SB-400. The inclusion of the v.f.o. shown will make the receiver capable of independent tuning. All capacitors less than one in value are in mf; capacitors greater than one are in mmf except for those with polarity marked which are electrolytics in mf. All 0.001 mf capacitors are disc ceramics with low voltage ratings. All resistors are ½ watt except those noted. Parts list describing unusual components appears elsewhere in this article.

drill press. The inside hole should be cut first and then the outside diameter.

The back of the dial is painted black, and 1 kc markers are scribed on one at a time. Draw a circle on the paint side of the plastic with a compass with the circle center at the plastic periphery center. The circle should be drawn about halfway between inside and outside diameters. Be careful not to scratch the paint because this circle will be used only as a construction aid in scribing the 1 kc marks.

Do not try to scratch on the 1 kc marks consecutively because they will not turn out to be evenly spaced. It is best to scratch on one as a reference and call it 0 kc. Next, scratch one on directly across from it and call it 50 kc. Each half-circle is then bisected with a mark, one called 25 kc and the other called 75 kc. A simple scribing template is included in fig. 3 to facilitate scribing the remaining marks. Number the marks every 5 kc. Number decals are applied on the front of the dial opposite the marks.

Next, five small holes are drilled in the plastic dial near the center, evenly spaced around the dial. Small bolts and spacers are used to fasten the dial to the brass wheel as shown.

The small drive shaft leading through the front panel is identical to the one in the SB-series. It slips onto the inside diameter of the round plastic dial plate. It was machined from a length of ¼" brass rod turned down on one end to ⅛" diameter, and fitted with two metal discs and a small spacer or washer. It is peened over like a rivet as is its little brother operating the hairline. It is possible that these little drive pulleys can be purchased from Heath since they are rather tedious to machine.

Figure 2, also shows the general design and dimensions of the front panel. It shows the relative position of the wedge shaped pointer and pulleys used to guide the dial cord to the 100 kc marker pointer. (These parts are on the rear of the panel). All bolts that must come through the front panel should be flat-headed and countersunk.

The front panel and the dial escutcheon are both made from one-eighth inch thick aluminum plate. The main panel is rounded at the corners and the escutcheon is beveled all the way around as is the plastic dial piece on the SB-series. The slots for the dials on the panel and escutcheon are drilled out and filed to shape together so that they will match up when assembled. The only thing holding them together is the three-quarter inch diameter bushing, (one-quarter inch i.d.), for the main tuning drive shaft. A one-eighth inch diameter hole is also drilled through the panel and escutcheon for the shaft of the zero correction control. This shaft is in relatively the same place as is its counterpart in the SB-400.

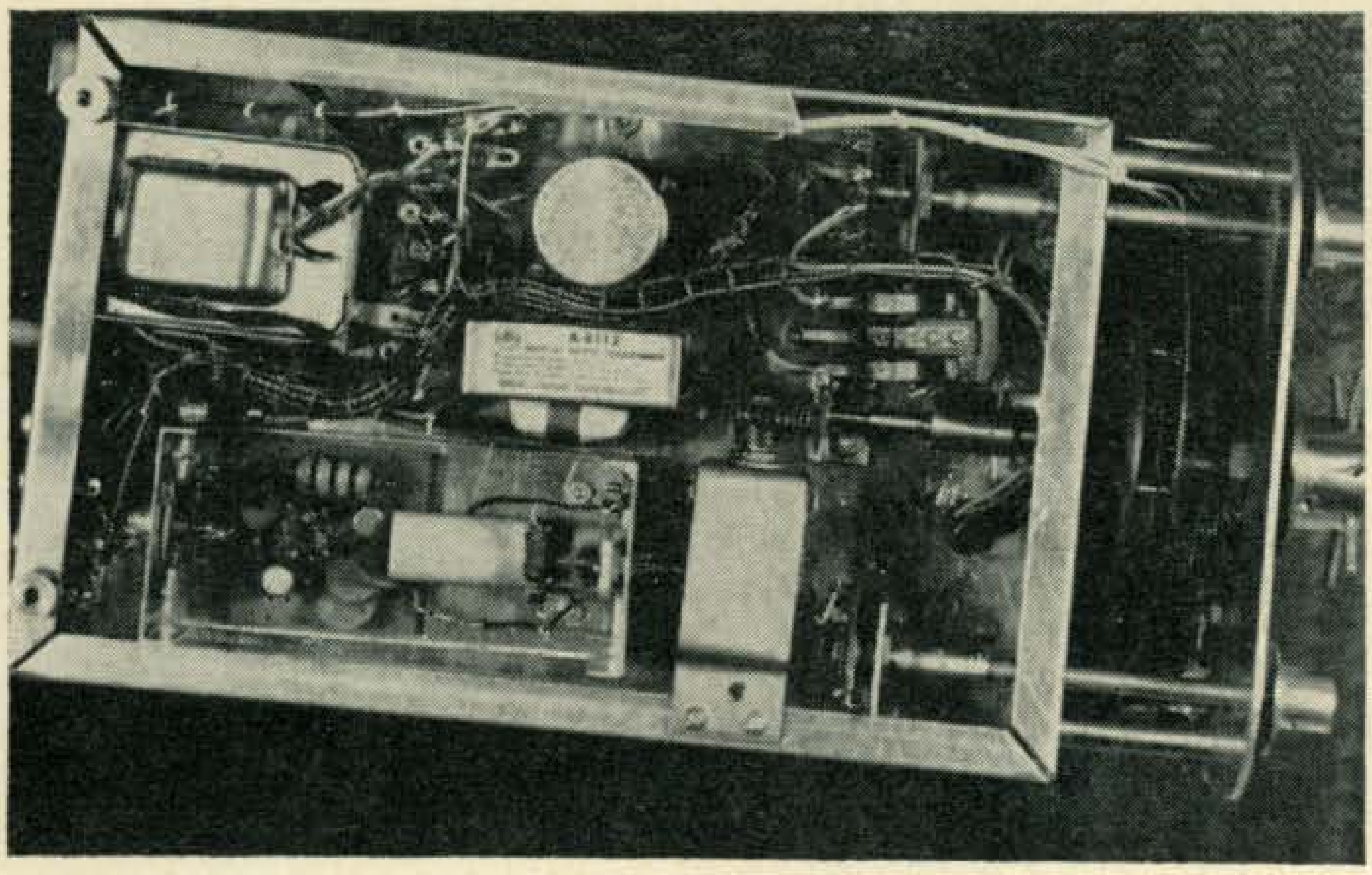
The dial mechanism can be a tedious job and again I remind the builder that it can all be omitted if transceive operation is anticipated all of the time. To those who choose to build this mechanism, I am sure that it will be worth all of the effort.

V.F.O. Circuit And Construction

The v.f.o. consists of Q_{14} as the oscillator and Q_{15} as an emitter follower isolation amplifier, Q_{15} presenting a constant load to the oscillator. Diode CR_1 is a zener-type which stabilizes the supply voltage to these two transistors. The tuned circuit consists of L_4, C_{41}, C_{42}, C_{43} and C_{44}. L_4 should be wound close spaced and the coil form rigidly mounted on one end of the v.f.o. chassis which is a 2¼ × 2¼ × 5 inch enclosed Bud Minibox. Make sure that the fixed capacitors connecting to L_4 are of the zero temperature coefficient type otherwise drift may become a problem.

The entire v.f.o. is housed inside of its own Minibox except for S_3, C_{41} and C_{43}. These components are mounted outside of the box at the same end as L_4 as shown in the bottom view of the receiver. Most other components are mounted on a 2⅛ × 2⅛ inch pre-perforated circuit board and mounted as shown in the pictures. Transistor sockets should be used, since for grid-dip oscillator checks, the transistors *must* be removed from the sockets.

Since the v.f.o. must oscillate approximately 3 kc lower in u.s.b. and c.w. than it does in l.s.b. in order to keep the same dial calibration when switching modes, a gimmick capacitor,



Bottom view of the Companion. The cover of the v.f.o. Minibox is removed exposing v.f.o. circuitry. Note the worm gear v.f.o. drive mechanism, and relay K_1. The v.f.o. gimmick capacitor, C_{43}, can be seen just to the right of C_{44}.

C_{43}, is connected in parallel with the tuned circuit for u.s.b. and c.w. The gimmick consists of a twisted pair of insulated wires acting as a capacitor. It was found that a twisted pair about one-quarter inch long is all that is necessary. Start with a gimmick about an inch long, then prune it to the correct length to give a 3 kc change in frequency with S_4 closed. This adjustment should be done after all others in the v.f.o.

Capacitor C_{41} is the main tuning for the v.f.o. and is a 75 mmf straight-line variable transmitting capacitor. Straight-line means that the capacity varies linearly with the shaft rotation. Since capacity varies inversely to the square of the frequency, it stands to reason that in order to preserve a linear change of frequency, as the dials have been calibrated, a straight-line capacitor cannot be used. Thus, C_{41} had to be altered slightly. It is necessary to bend the outer most rotor plate such that it bends outward from the other plates as the rotor is opened. This bending, if done properly, will cause rotation to be linear to frequency and not capacity. The bend should become increasingly sharp as the edge of the plate is reached. Bending can be accomplished by the careful use of long-nose pliers. An illustration in fig. 5 may be of assistance.

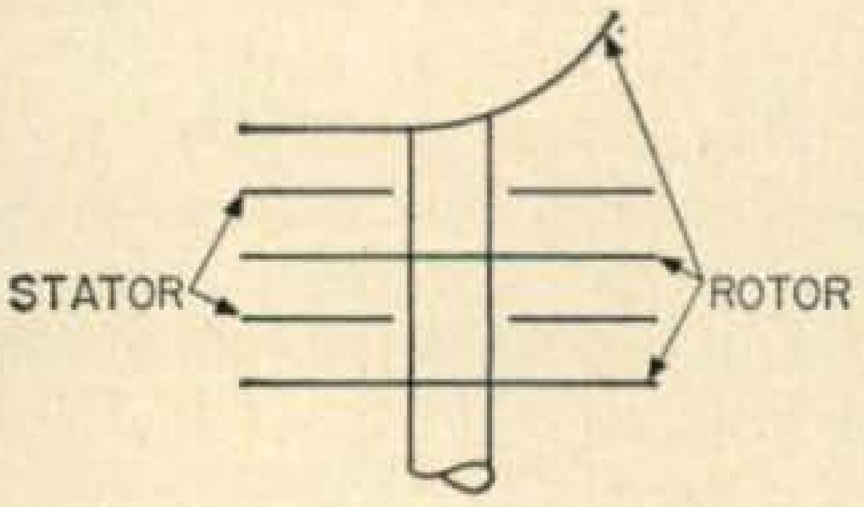


Fig. 5—Detail of how one rotor plate of C_{41}, the v.f.o. tuning capacitor, should be bent to accomplish linear calibration of the v.f.o. dial.

Keep in mind that as the rotor is meshed into the stator, the gap between the plates must become narrower. If the plate should tear away from the shaft while bending, it can be soldered back on but make sure that no solder drips down and shorts the rotor to the stator. Final bending is adjusted as the v.f.o. is being calibrated.

The v.f.o. tuning capacitor is mounted at right angles to the one-quarter inch diameter shaft coming from the round dial plate and is connected to it by a 40:1 worm gear as shown in the bottom view picture. The gear ratio is not that important; it is only vital to remember that it must be in the neighborhood of 40:1. Any deviation from this ratio can be compensated for in the final v.f.o. calibration. A gear of this type should be available from most motor repair shops. Since the gear presents a high ratio from the 0-100 kc dial to C_{41}, only about 25% of C_{41} is actually used as a variable capacitor.

With the dial set at the high edge of the band, tighten the set-screws on the worm gear to the tuning capacitor with the capacitor at half-mesh. As the dial is turned to the low end of the band, the capacitor should open with the gap between the first two plates becoming wider. If it closes instead of opens, rotate the capacitor shaft 180 degrees to the half-mesh point again and tighten the set-screws. (The dial should be at the high end of the band while setting at half mesh.) The variable capacitor should now be varying between 50% and 25% mesh as the dial goes from the highest end to the lowest edge of a band. This change of capacity shunted with C_{42} will vary the v.f.o. frequency approximately from 5.0-5.5 mc. It may seem strange that as the dial indicates a decrease in frequency, the v.f.o. itself is actually increasing frequency toward 5.5 mc. This reverse action is necessary because the v.f.o. operates on the low side of the signal coming from Q_3, fed to Q_4, and not the high side which is the more common practice.

V.F.O. Adjustment

In the preliminary adjustment of the v.f.o., a grid-dip oscillator may be necessary to see if the tuned circuit is anywhere near where it should be, 5-5.5 mc. Transistor Q_{14} should be removed from the socket, however, because no dip will be indicated with a semi conductor directly across a tuned circuit. Any number of variables may be present in the L_4 coil form which may make it necessary to add turns or subtract them in order to resonate properly. Before tampering with the coil, however, try to select a slightly different range on C_{41} by rotating its shaft slightly away from the half-mesh point before tightening the shaft set-screws. This will cause a different amount of shunt capacity to be in parallel with L_4 thereby altering its frequency range.

Once L_4 is made to resonate somewhere in the ballpark, the v.f.o. can be calibrated against the SB-400 v.f.o. The use of a receiver covering 5.0-5.5 mc will be helpful but not necessary. If this receiver is not available, it will be necessary to place the v.f.o. output in parallel with the SB-400 v.f.o. output by connecting across the 100 ohm resistor at the output jack of the SB-400 v.f.o. They will both be heterodyned into the desired ham band by the rest of the SB-400 with the transmitter function switch in the SPOT position. When the two v.f.o.'s are on the same frequency in the 5.0-5.5 mc range, they will appear on the true frequency indicated by the SB-400 dial, zero beat with each other. Compare dial readings assuming the SB-400 dial to be correct.

If, when tuning the receiver v.f.o. across its full range it is noticed that the receiver v.f.o. does not cover the full half megacycle spread as the dial indicates, increase the slug in L_4 and slightly decrease C_{44}. This will increase the frequency range that C_{41} will cover. (The reverse is also true.) Once the limits of coverage are established to be 5.0-5.5 mc, check at various points on the band to see if the two v.f.o.'s correspond. If they do not it will be necessary to try bending the plate on C_{41} a little more one way or the other to approach a more linear frequency change. This adjustment is not an easy one, but it can be perfect. After the bend is changed even a little, it will be necessary to readjust the end limits again. Only minor adjustment should be necessary, however. Accuracy to within 1 kc over the entire band can be achieved by this trial and error method.

SB-400 Changes

Before delving into the receiver itself, it is necessary to illustrate the changes to be made to the SB-400 so that the reader can follow what is happening in the receiver-transmitter combination.

When making the SB-400 modifications it was noticed that the labels on the phono jacks in back of the transmitter did not correspond exactly to what they were called in the SB-400 schematic diagram. A table for converting these names from the schematic to the actual label may be helpful.

SB-400 Schematic	*Rear Apron Name*
Rcvr Het Osc Input	Rcvr Het Osc
Spare	Spare
Linear ALC Input	ALC Input
Rcvr Mute	Rcvr Mute
Het Osc Output	Rcvr LMO
Rcvr BFO Input	Rcvr BFO
Linear Relay	Linear Relay
Rcvr Audio	Rcvr Audio
Spkr	Spkr
Anti-Vox	Anti-Vox

Throughout the rest of this article keep in mind that the label referred to will always be what is on the actual jack and not on the schematic. Even though many of the names are similar, there is room for confusion if one set of labels is not followed exclusively.

RG-174 coaxial cable or an equivalent type of small gauge shielded cable is used quite extensively throughout the SB-400 conversion and the receiver construction. About twenty feet of this cable should be on hand before any construction begins.

A step by step description of the SB-400 changes follows:

1—Disconnect the ground wire at pin 6 of relay 1. Disconnect the gray wire on pin 2 of relay 1 and connect it to pin 6. Disconnect the violet wire at both ends that runs from lug 11 of FS2R to R_{64} and discard. R_{64} can be located on the top of the chassis behind the v.f.o. Connect a length of hook-up wire from the RCVR MUTE jack to lug 11 of FS2R. Connect a length of hook-up wire from the LINEAR RELAY jack to the free end of R_{64}.

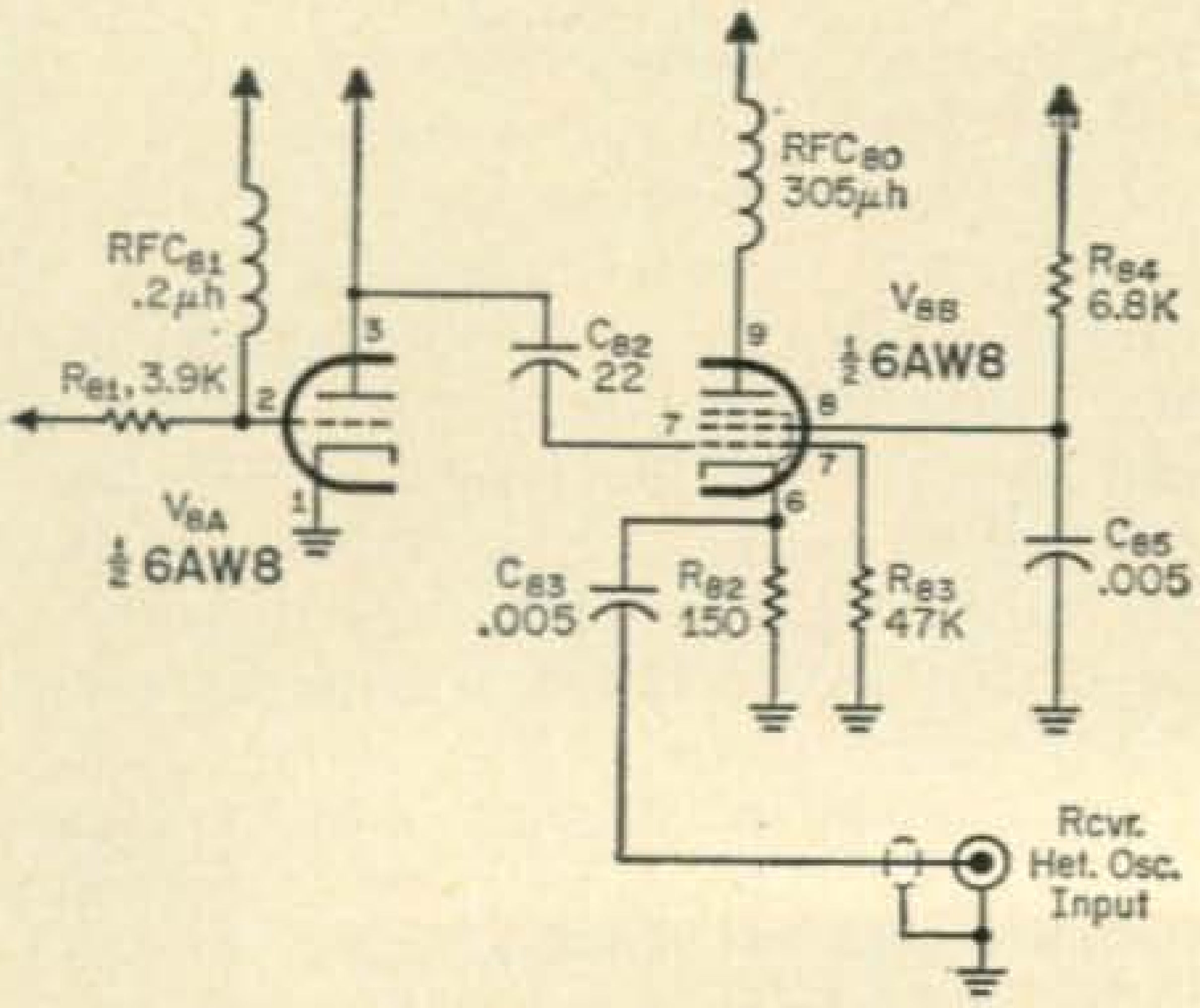


Fig. 6—Changes required in the SB-400.

2—Connect a short length of bare wire from lug 2 to lug 3 of MS49.

3—Disconnect the white-green wire at the ALC INPUT jack. Tape the wire end and secure it out of the way.

4—Refer to fig. 6. The 6AW8 B section must be changed to a cathode follower between the heterodyne oscillator output and the receiver. Although fig. 6 is a schematic diagram of the modified circuit, a step by step procedure will be useful. Disconnect the ground side of C_{83}. Remove C_{86}. Connect the free end of C_{83} to lug 1 of terminal strip TD. Disconnect C_{82} from pin 9 of V_{8B} and connect it to pin 7. Remove R_{80} and C_{80}. Remove the wire at the RCVR LMO jack.

5—Connect one end of a length of RG-174 to the RCVR LMO jack. Connect the other end in parallel with R_{63} at the rear of the v.f.o. Ground the braid at both ends.

6—Install a d.p.d.t. miniature relay having a 110 v.a.c. coil as close to the crystal filter as possible on the under side of the chassis. The relay that I used is about the size of an FT-243 crystal. Connect the relay coil to the 110 v.a.c. external antenna relay socket at the rear apron of the SB-400. Use inside chassis solder connections and not an a.c. plug.

Rewire the crystal filter as shown in fig. 7. When the relay is energized the 3.395 mc crystal filter (2.1 mc bandwidth) will be switched back to the transmitter circuit.

All necessary changes to the SB-400 are now completed. It can be put back in its case and temporarily set aside.

Receiver Circuit And Construction

The receiver, itself, will be discussed in progression from antenna to audio output. The circuit is shown in fig. 4.

Relay K_1 contacts are shown in two different places in the schematic diagram, but it is really only one relay. Jack J_2 connects to the external antenna changeover relay plug at the rear apron of the SB-400. Relay K_1 performs the function of connecting the receiver to the antenna while receiving and shorting the antenna input to ground while transmitting. This is considered necessary to prevent any transmitted power from burning out Q_1.

R.F. Amplifier

Q_1 is an RF amplifier that feeds directly to Q_2 coupled through L_2. Control R_4 performs the function of varying the bias on Q_1 making it the RF GAIN control. Switch S_4 is the power ON-OFF switch and is part of R_4.

Since Q_1 has a tuned input and a tuned output, this stage may tend to go into oscillation if precautions are not taken. Because the bandswitch,

S_1, is several inches away from Q_1, L_1 and L_2, the leads connecting these components to S_1 are 3 to 5 inches long. Mount the coils as shown in the top view with the ten meter coils closest to the switch and the eighty meter coils farthest away. The leads should be straight and as short as possible. The top view shows the relative positions of the five coils of L_1 and the five coils of L_2. Only the 20 meter coils are shown throughout the schematic to reduce confusion. A sheet of thin copper is placed between the coils of L_1 and the coils of L_2 to reduce coupling. A copper sheet is also placed between the two wafers of S_1. Both copper shields are then grounded. There are two sets of single pole five position switches on each wafer of S_1. Make sure that the leads from the L_1 coils connect to one wafer and the leads from the L_2 coils connect to the other wafer. Do not mix them up otherwise the copper shield between wafers will serve no purpose and Q_1 may go into oscillation.

First Mixer

Transistor Q_2 is the first mixer heterodyning the received signal with the heterodyne oscillator in the SB-400. The output of Q_2 is always between 8.395 and 8.895 mc. Tuned circuits BP_1 and BP_2, shown in fig. 4, are identical bandpass filters for this frequency range. They have been designed to work from and into a 2000 ohm load.

Transistor Q_3 is an 8 mc i.f. amplifier feeding into BP_2. Inductors L_5 and L_6 in the filters are each made from subminiature 455 kc transistor IF coils. These i.f.s are very small and are the type found in transistor pocket radios. Since BP_1 and BP_2 operate at a frequency other than 455 kc, L_5 and L_6 could not be adapted directly from these miniature i.f.s.

To modify them carefully bend over the flaps on the bottom of the transformers and remove the outside can. Unscrew the slug and remove it from the coil. With a knife, remove the tiny powdered iron coil form breaking the wires connecting the coils to the terminals on the base. Remove the old coil from its form by scraping it with a knife. Discard the old wire. To rewind the coil to the required specifications, use #38 or 40 enamel wire. Wind 2 turns onto the little form spacing the turns about one turn width. Carefully put the powdered iron core with the new coil back onto its pedestal and connect each end of the coil to any two of the five terminals on the coil base. The thin wire can be cleaned for soldering with fine sandpaper. Don't attempt to scrape the wire clean with a knife. Remember which two terminals are used because the other three will not be used.

Screw the slug back onto the coil. Connect a 0.001 mf disc ceramic capacitor across the coil using very short (¼ inch) leads. Check with a grid dip oscillator to see if the coil resonates at about 8.9 mc with the slug at close to its mid-position. With only 2 turns making up the coil, the slug will shift the frequency over a rather large range. Spreading or compressing the turns may be necessary to bring the resonate frequency to 8.9 mc. Construct four such coils for the two bandpass filters.

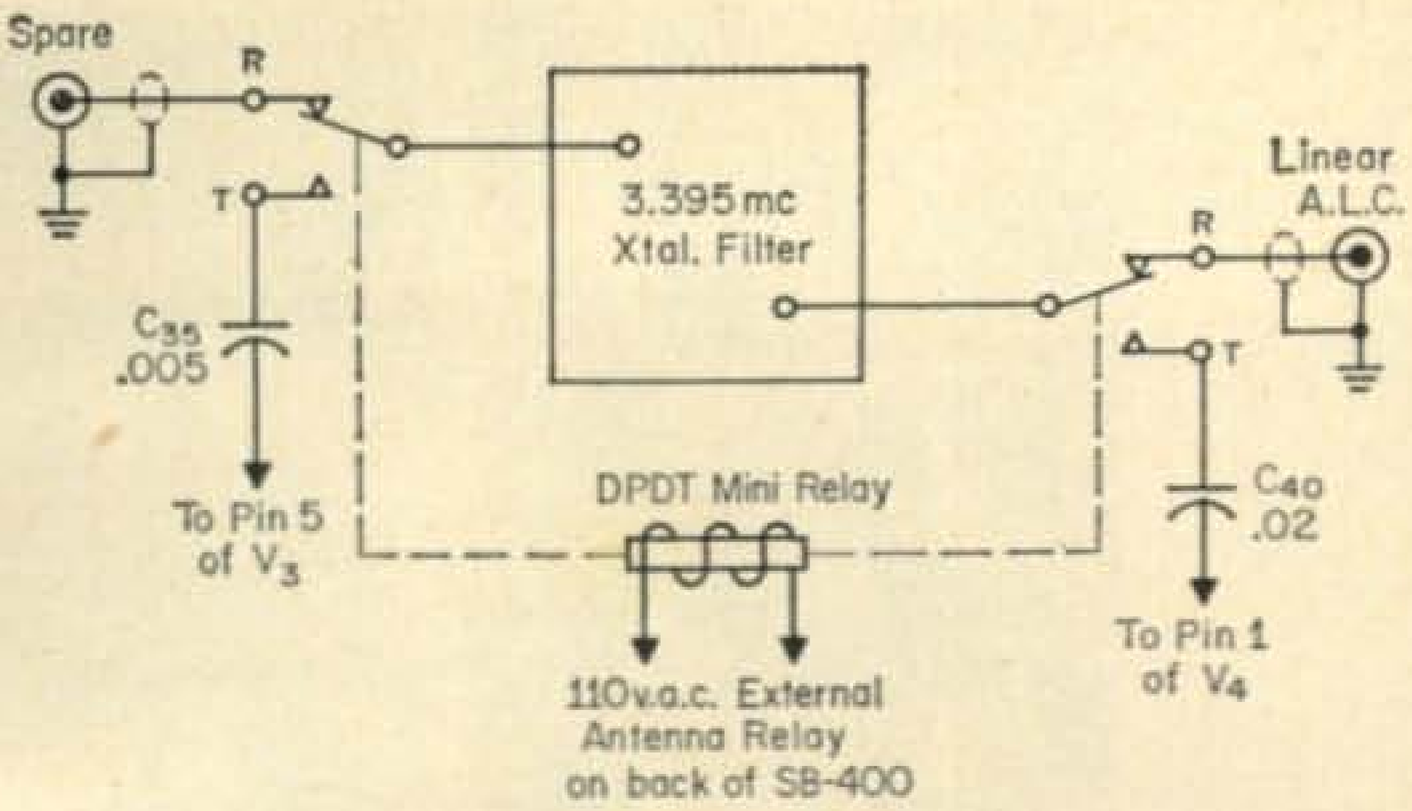


Fig. 7—Wiring necessary within the SB-400 to switch the 3.395 mc filter between the Companion receiver and the transmitter.

Second Mixer

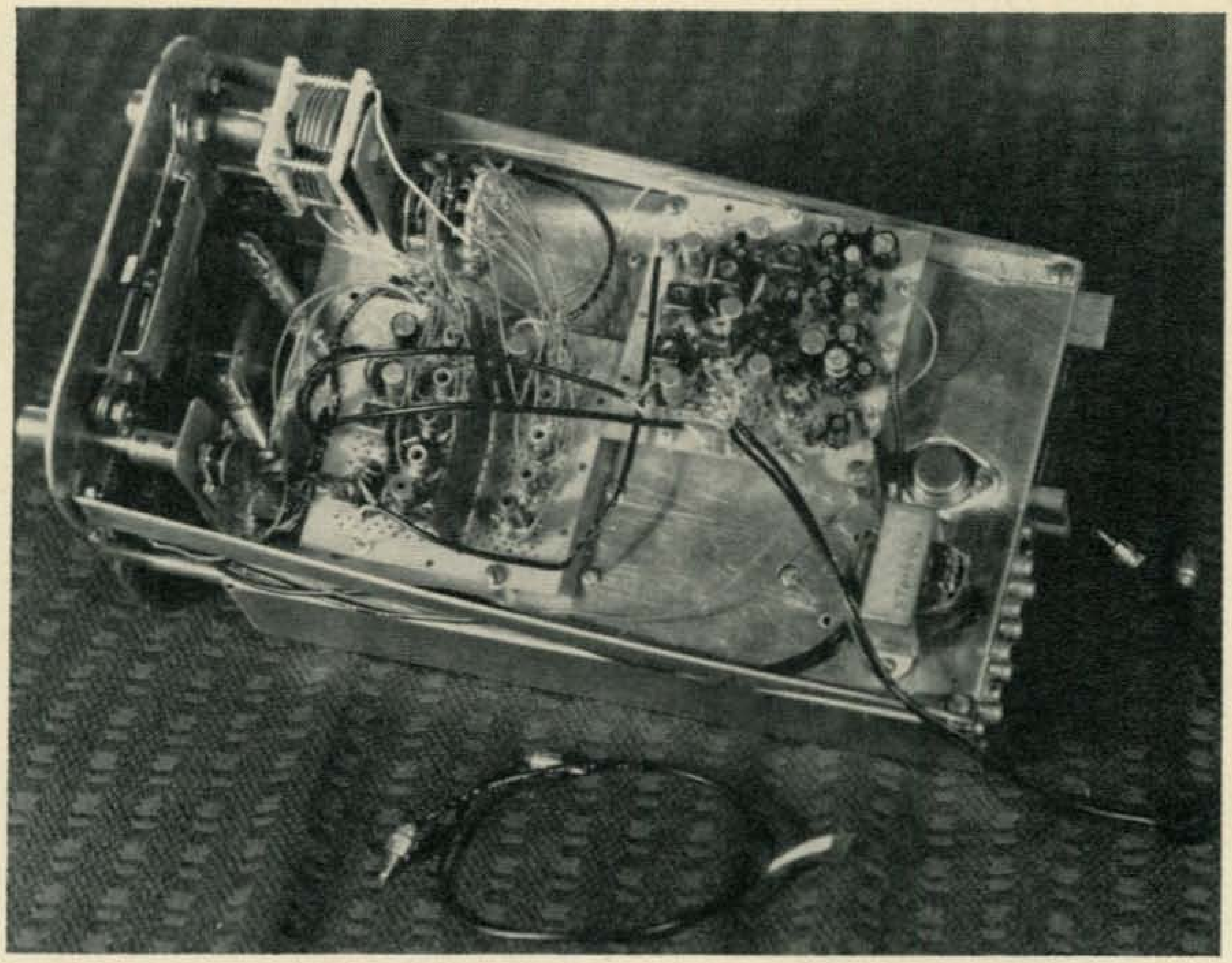
Transistor Q_4 is the second mixer converting the 8 mc output of Q_3 to 3.395 mc by heterodyning the signal with the 5.0 to 5.5 mc *transmitter or receiver* v.f.o. Q_4 then feeds to the crystal filter in the SB-400. While receiving, the crystal filter is switched into the receiver circuit and when transmitting the crystal filter is switched back to the transmitter circuit. Inductor I_3 resonates at 3.395 mc and couples to Q_5, the first 3.395 mc i.f. amplifier. Components L_3, Q_5, T_1, Q_6 and T_2 make up the two stage 3.395 mc i.f. amplifier.

Transformers T_1 and T_2 are also made from i.f. transformers of the same type as those used to construct L_5 and L_6. Dismantle the coil by the same method as before removing the old coil with a knife. Wind about 35 turns of #38 or 40 enamel coil wire onto the little powdered iron form and connect the ends to any two terminals on the form base as in L_5 and L_6. Connect a 20 mmf disc ceramic capacitor across the coil and screw the slug back onto the form. Check with a g.d.o. to see if the coil is resonating on or about 3.395 mc. It may be necessary to remove turns or add them a few at a time to get the coil on the right frequency. Thirty-five turns is only a starting point. It is impossible to designate a definite number of turns because many of these little i.f. transformers are different in core and slug size. A g.d.o. is a must in making these coils.

Once the coil is made to resonate on 3.395 mc, wind ten turns of the same type wire over the first winding. The under layer is the primary and the top layer the secondary. Remove the enamel from the leads with sandpaper and solder them to another pair of terminals at the coil form base. Reassemble the coil noting which is primary and which is the secondary. Make two such coils.

Product Detector

Transistor Q_6 feeds into a product detector consisting of Q_7 and Q_8. The b.f.o. for the product detector is in the SB-400. Oscillator V_2 in the transmitter serves as a b.f.o. for the receiver and its original function as carrier generator for the transmitter. This oscillator, along with the selectivity of the crystal filter, determines which mode



Top view of the Companion. The dial mechanism, C_4, and S_5 can be seen in detail. The two small transistor i.f. cans on the front circuit board are L_5 and L_6 of the first bandpass filter BP_1. The two lengths of RG-174 extending to the rear are to be as short as possible. For this reason they are not routed through the rear panel jacks. These cables connect to the crystal filter in the SB-400. The cable in the foreground is one of several used to connect the SB-400 to the receiver.

the receiver is receiving on. Q_7 and Q_8, after detecting the received signal by the heterodyne method, feed into the first audio amplifier, Q_9.

Audio Amplifier

Transistor Q_9 is in a grounded base configuration. Part of the detector output feeds Q_{10} and the S-meter and part continues on to further cascaded audio amplifiers, Q_{11}, Q_{12}, and Q_{13}. Since it is not necessary to use a.v.c. on s.s.b. or c.w. reception, none is used in this receiver. The S-meter merely samples the rectified audio from Q_{10}. Q_{10} is biased to cut-off by the adjustment (with no signal) of R_{35}. When CR_2 rectifies the audio output of the product detector, the negative pulsating d.c. causes Q_{10} to conduct. The S-meter then measures the collector current of Q_{10}. The meter swing is proportional to the strength of the product detector output. This method of incorporating an S-meter is a bit unconventional, but works very well and is independent of the setting of the audio gain control. The S-meter used is a Japanese meter already calibrated in S units. The actual full scale current rating of the meter is unknown, but it is on the order of 1 ma.

Transistors Q_{11} and Q_{12} are conventional common emitter audio amplifiers.

Transformer T_3 is a TV vertical output type. Any transformer with a turns ratio of from 8 to 12:1 may be used. It doesn't have to be as physically large as the one I used since Q_{12} has very small audio power output. Q_{13} is a 2N301 or equivalent power transistor. The collector draws about one-half amp of current at about twelve volts. With this input the audio output is approximately 3 watts.

It will be noticed that every transistor in the receiver is biased for Class A linear operation except Q_{10}.

Construction Hints

1. Use RG-174 for all shielded cable runs.
2. Use old FT-243 crystals for the male jacks plugging into J_2 and J_{11}. Disassemble the crystals and discard the contents. Drill a hole in the back of the holder and insert the wires soldering them to the pins. Replace the face of the holder. Any other type of socket and plug combination can be used for J_2 and J_{11}, but I used this type because of the limited chassis space on the receiver rear apron. These jacks are quite narrow and do not take up much room.
3. It is advisable to lace-up the wires and cables wherever two or more run parallel to each other. This makes for a neat wiring job. Lacing techniques are described in the handbooks.
4. Use a grid dip oscillator to check all coils before mounting them to make sure they resonate on the proper frequency. It is very frustrating to have to pull coils after they are already wired in. The number of turns on coils L_1, L_2, L_3, T_1 and T_2 are all approximate due to the various sizes of wire which can be used and countless other variables. Whenever coil links are required, the number of turns specified in the schematic diagram should *not* be deviated from. Ground the coil cans on L_5, L_6, T_1 and T_2.

5. Use transistor sockets for all transistors except Q_{13}.

6. Secure the front panel to the chassis front with two 1⅞ inch long spacers and flat head bolts as shown in the front and bottom views.

7. Mount all ½ watt resistors upright.

Initial Adjustment

With all cables connected to the transmitter and receiver, turn the transmitter and receiver power switches on. Advance the receiver R.F. GAIN control fully clockwise and the A.F. GAIN control about ¾ fully clockwise. All other knobs should be self explanatory. Use a g.d.o. as a signal source for initially tuning up the receiver. It may be necessary to couple the g.d.o. rather closely to L_1 to initially force a signal through the receiver. Set the receiver and transmitter bandswitches to 80 meters. Tune the g.d.o. across 80 meters. Somewhere in that range a signal should be heard. Back off the g.d.o. until the received signal becomes quite weak. Set the preselector, C_4, to about half mesh. Peak up the 80 meter L_1 and L_2 coils for maximum output. Peak up the bandpass filter coils, L_3, T_1 and T_2.

Once the bandpass filters and the 3.395 mc i.f.'s are tuned up, they need not be touched again regardless of the band used. If T_1 and T_2 appear to be oscillating, indicated by various heterodynes or "birdies" coming and going as the coils are tuned, back off the slug of either T_1 or T_2 until oscillation stops. I experienced no oscillations anywhere in the i.f. stages when tuning up my receiver, but this does not dismiss the possibility in all cases since no neutralization is used.

Change to the various bands and repeat the tune-up of the respective L_1 and L_2 coils. For 40 meters set C_4 to about half mesh. For 20 meters set C_4 to about 25% mesh and for 15 and 10 meters set C_4 to about 10% mesh before adjusting L_1 and L_2 for each band.

Turn off the g.d.o. and tune across a band that you know is open. Find a signal and peak up C_4. Peak up L_1, L_2, L_3, BP_1, BP_2, T_1 and T_2. Adjust L_1 and L_2 again with the preselector control, C_4, at its proper mesh point outlined above for each band. Once the receiver is peaked up on all bands it need not be touched again except for the preselector. The correct setting of C_4 will change slightly from one end of the band to the other. It should be adjusted for maximum signal strength on each received signal.

With S_2 and S_5 in XCV position, tune the transmitter v.f.o until a signal is received on any band. Vary C_{16} until the signal strength is maximum. This adjusts for correct coupling of the SB-400 v.f.o. to Q_4.

The SB-400 cannot be used anymore by itself or with another receiver unless a jumper is connected from the RCVR MUTE jack to the LINEAR RELAY jack at the back of the transmitter. This jumper for the most part restores the SB-400 to its original condition so it can be used without the receiver described in this article.

Operation

The switches and controls on the receiver that are similar to the ones on the transmitter such as the bandswitch should be in corresponding positions. It wouldn't make much sense to have the two bandswitches on two different positions.

The sideband selector in the receiver is used only when the receiver is tuned separately using the receiver v.f.o. If you are receiving an u.s.b. signal, the mode switch on the SB-400 must be U.S.B. to switch the proper crystal into the b.f.o. that feeds the receiver product detector.

The receiver audio gain control is really not a gain control at all, but a volume control because it does not vary the gain of any stage. It merely divides the audio signal to a desirable listening level. This control will not have any effect on the S-meter readings, but the R.F. GAIN control will. Normally the R.F. GAIN will be advanced fully clockwise.

I believe that building this receiver will be educational and provide enjoyment to almost any ham and that time on the air with it will prove to be most satisfying. You will be as proud of your homebrew receiver as I am of mine. ■

Parts List

C_1, C_6—47 mmf mica. Used on 80m. coils only.

C_4—5-40 mmf per section butterfly variable capacitor. (Hammarlund BFC-38 suitable).

C_{41}—75 mmf transmitting-type variable.

C_{42}—43 mmf zero temperature coefficient mica.

C_{43}—Gimmick capacitor. Two insulated wires twisted together.

C_{44}—10 mmf miniature variable. (Hammerlund MAC-10).

C_{45}—100 mmf zero temperature coefficient mica.

C_{46}, C_{47}, C_{48}—10 mmf zero temperature coefficient mica.

CR_1—1N751 Zener diode.

CR_2—1N34 or equivalent.

CR_3-CR_6—Low voltage 750 ma silicon rectifiers.

K_1—D.p.d.t. relay. 117 v.a.c. coil. (P & B KA11AY).

L_1, L_2—**80m.** 50t. #38 d.c.c. close wound on a ¼" dia. slug tuned with a 10t. link. 47 mmf capacitor for this band *only*.

40m. 30t. #38 d.c.c. close wound on a ¼" dia. slug tuned form with a 6t. link.

20m. 20t. #38 d.c.c. closewound on a ¼" dia. slug tuned form with a 4t. link.

15m. 10t. #38 d.c.c. closewound on a ¼" dia. slug tuned form with a 3t. link.

10m. 8t. #38 d.c.c. closewound on a ¼" dia. slug tuned form with a 2t. link.

L_3—20t. #38 d.c.c. closewound on a ¼" dia. slug tuned form.

L_4—19t. #34 d.c.c. closewound on a ¾" dia. slug tuned form.

L_5, L_6—See text.

Q_1-Q_8, Q_{14}, Q_{15}—2N1177, 2N1179, 2N1180, 2N370, 2N372 or 2N247.

Q_9—2N414.

Q_{10}—2N188 or 2N633.

Q_{11}, Q_{12}—2N408 or 2N409.

Q_{13}—2N301A or equivalent.

T_1, T_2—Subminiature 455 kc i.f. transformers. See text.

T_3—Filament transformer. 25.2 v.c.t. 1.0 a. (Stancor P-6469).

T_4—10:1 ratio TV vertical output trans. (Stancor A-8112).

T_5—20 ohm to 8 ohm output trans. (Knight 62Z337).

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TOMORROW'S THINKING IN TODAY'S PRODUCTS

For further information, check number 15, on page 110

Special Subscriber Service

The Telephone Company's Answer To Amateur Radio

BY JERZY OSTERMOND-TOR,* Ex-YM4XR

THE publishers of CQ are proud to again have Professor Ostermond-Tor as a visiting editor this month. Professor Tor's previous articles in CQ, "Ionospheric Amplification" which appeared in April, 1964 and "MEMTAC—A New Method of Communication" which appeared last April, both created a great amount of interest in amateur radio. This year, Professor Tor discusses a revolutionary proposal made recently by the Organisation Nationale d' Industries Téléphoniques *(ONIT), for establishing a special subscriber telephone service which could have a tremendous impact on the future of amateur radio.*

THIS past summer, in the Swiss city of Geneva, hundreds of telephone experts from almost every country in the world met for the 1966 Plenary Assembly of the *Organisation Nationale d'Industries Téléphoniques*, or ONIT for short.

While ONIT deals almost exclusively with *telephone* matters, at least one proposal considered at the meeting could have a tremendous impact on the future of amateur radio as it is known today. In much the same way that underseas cables have replaced h.f. radio telephone communications, the proposal suggests that a special telephone service replace amateur radio!

I attended the ONIT meetings along with my colleague from the Lauton Institute, Emil Heisseluft. *CQ* readers may remember Emil from the article he wrote two years ago.[1] The Lauton Institute is famous in the telephone field and represents several European telephone organizations.

CONFERENCE DES TELEPHONIQUES
ONIT
ONIT

Geneva Conference Hall in which was held the 1966 Plenary Assembly of the Organisation Nationale d'Industries Téléphoniques (ONIT). *(Official ONIT Photo.)*

As many of you know, for the past two years I have been a member of the Institute. I enjoy my work very much there, and I especially enjoy the nearness of the Institute to the wonderful city of Vienna, which is so dear to my heart.

As far as I know, I was the only person attending the ONIT meetings who admitted having a radio amateur background. Perhaps there were some others, but the nature of the meetings was such that they did not want to admit it. Since ONIT is an international telephone organization it is very unlikely that what I have to report will be seen in any other radio amateur publication, although it is of the greatest importance to every radio amateur. Indeed, if the ONIT proposal is approved, amateur radio as we know it today could change completely in the future. Telephones would replace transmitters, receivers and antennas, licenses would no longer be required, and there would be no more QRM or frequency problems!

ONIT

It was a warm, sunny July afternoon in Geneva, when I decided to gather up the ONIT documents that had accumulated during the day and head for one of those delightful sidewalk cafés that dot the Quai du Mont-Blanc. The sweet tasting apéritif, and the breath-taking sight of blue Lake Geneva flecked with the colors of the rainbow from the sails of dozens of sailboats gliding in the warm breeze, and backdropped

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*Correspondence to Professor Ostermond-Tor should be addressed to him c/o *CQ*, 14 Vanderventer Ave., Port Washington, L. I., New York, 11050.

[1] Heisseluft, E., "Developing A DX Voice", *CQ*, April, 1965, pp. 52-54.

ONIT assembly shown discussing the special subscriber telephone service (SSS), proposed as a substitute for amateur radio. *(Official ONIT Photo.)*

by the lush green of the countryside and the ice covered summit of Mont-Blanc glistening in a cloudless sky, relaxed me and I began to study the ONIT documents.

The first one I picked up dealt with the design of a newly shaped telephone with the receiver, transmitter and dial all in one piece, and small enough so that the entire instrument can be held in the palm of the hand. Another document dealt with the world-wide standardization of telephone numbers in order to prepare the way for international direct dialing, and a third paper dealt with the advantages of electronic switching as compared to electro-mechanical methods. Then my eyes shifted to a paper sticking out from near the bottom of the pack. I could read the title, "A Proposed New Service For Telephone Organizations." This sounded interesting, so I pulled the report out. It had been prepared by the most important Committee of ONIT-Committee O. This Committee, headed by the world-famous telephone expert Dr. Sidney Wickfen, is responsible for developing new revenue sources and new services for telephone organizations. As you can imagine, dear readers, reports prepared by Committee O are given top priority by ONIT. Two other famous experts assist Dr. Wickfen on Committee O; Herr Rudi Kitzler and Monsieur Roger Richard.

After reading the report through once, I could hardly believe my eyes. Perhaps I had one too many apéritifs, or perhaps the warm afternoon sun was taking its toll! How can it be? Here is a paper proposing what in effect would be amateur radio by means of telephone!

Report COM. 0-7

For those readers who may have access to ONIT documents, the report in question bears serial number COM. 0-7, and is dated 12 July 1966. ONIT does not permit its reports to be published or quoted directly. I can, however, discuss the report in a general way, and I will do so.

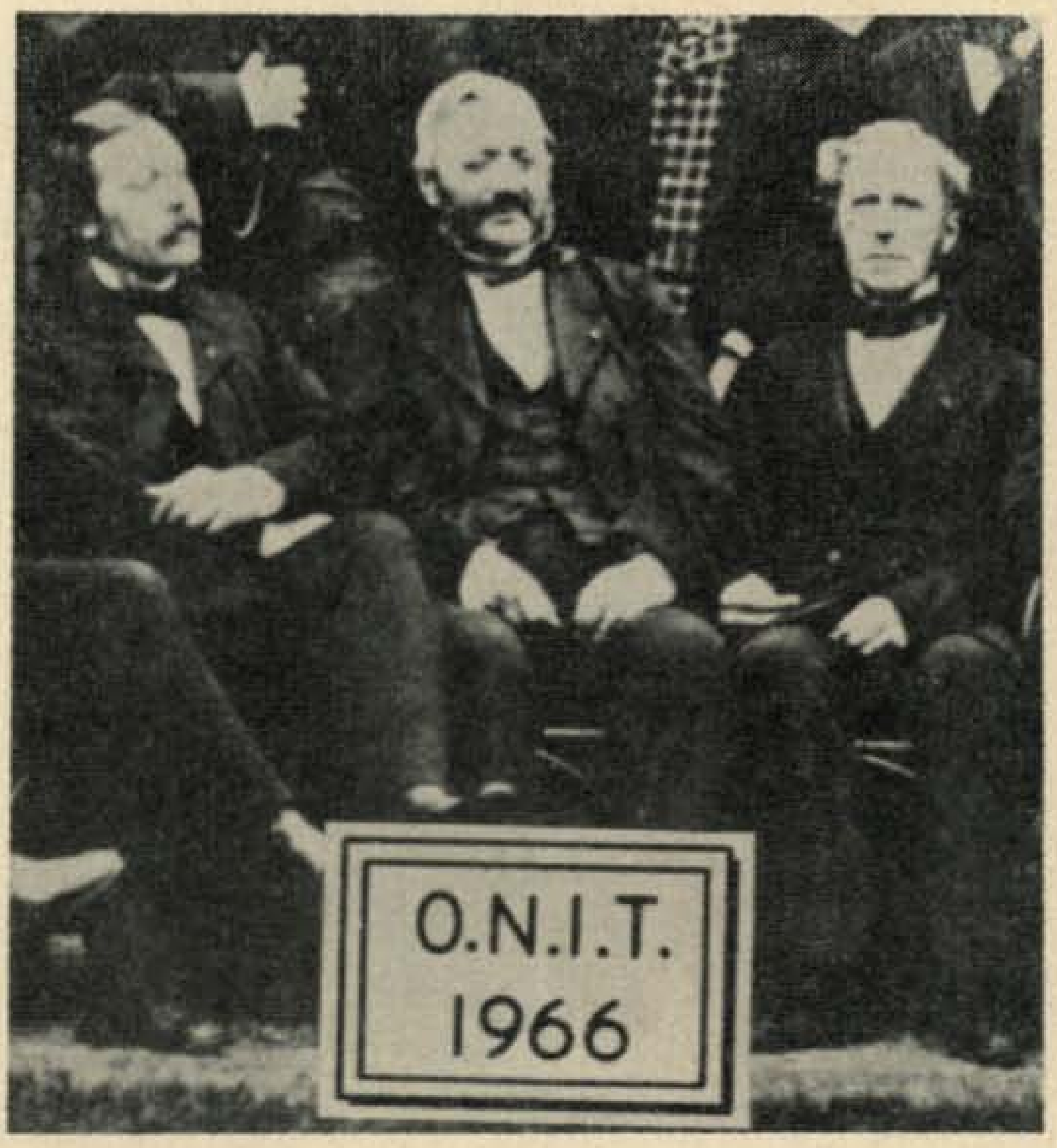
The report begins with an explanation of the amateur radio service. It quotes figures which appear to me to be quite correct, stating that there are at least 350,000 licensed radio amateurs throughout the world, and as many as 650,000 who are interested in amateur radio but who are not licensed for one reason or another. A growth curve is shown which estimates that this number will more than double during the next ten years. The report goes on to point that most radio amateurs are attracted by the thrill of speaking to far away places, to persons they will probably never meet. Most radio amateurs, the report states, are fascinated by the same psychological mechanism that urges one to play Russian Roulette.

The ONIT report contains a lengthy discussion of the serious frequency problem facing amateur radio, quoting liberally from several articles and editorials which have appeared in amateur radio publications on this subject.[2]

The report concludes that the time is ripe for the telephone organizations of the world to provide an alternative service to radio amateurs. It points out that such a service could be profitable, and would attract a large number of the world's licensed radio amateurs and an even larger number who want to enjoy the thrills of amateur radio without the necessity of a license, transmitter, receiver or antenna, etc. In the event some future radio conference votes to eliminate the amateur radio service, the report states that the telephone service would provide an adequate substitute.

SSS

ONIT Document COM. 0-7 then goes on to propose a new telephone service along the following lines:



Members of the famous ONIT Committee O, which proposed SSS. Dr. Sidney Wickfen of the United Kingdom, chairman of Committee O is shown in the center. To his left is Herr Rudi Kitzler of Germany, and to his right Monsieur Roger Richard of France. *(Photo by Heisseluft).*

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[2] For example, Walker, Prose A., "Two Plus Two Equals Four," *QST*, Oct. 1963, pp. 48-50.

Demonstration of SSS at the ONIT meeting. SSS will provide most of the thrills of amateur radio but will not require a license or radio equipment. (*Photo by Heisseluft*).

1. The new telephone service is to be called *special subscriber service*, or SSS.

2. A small *encoder* will be attached to a regular telephone enabling it to be used as an SSS phone by merely flicking a switch. When in the SSS position, an inaudible signal will be transmitted from the encoder, switching the SSS phone to a master computer system which is now in use by telephone companies throughout the world.

3. The computer, on a purely chance basis, will connect the SSS telephone to another SSS phone anywhere in the world. The computer may connect two phones in the same town, or it may route the signal through satellites or underwater cables to another SSS phone thousands of miles away. It is the chance operation of the computer that will provide much of the thrills in the SSS operation.

4. Once connected by the computer, the SSS phones will remain connected for at least one minute. This should be enough time for the "SSS operators" to exchange names, QTHs, signal reports (which will vary depending upon the routing of the signal as chosen by the computer), and all the other tidbits that are presently exchanged by radio amateurs. While a minute is the *minimum* time for an SSS QSO, the circuit will remain in operation as long as the computer does not select one of the engaged SSS phones for another call.

5. Each SSS telephone will receive a special number which will resemble the callsigns now allocated to radio amateurs. It is also expected that SSS operators will exchange QSL cards to verify SSS contacts in much the same manner that this is now done by radio amateurs.

6. There will be a nominal monthly charge for the SSS telephone. The charge will be low enough (probably no more than $5) so that it will be economically attractive when compared with the cost of a radio amateur receiver, exciter, linear and antenna, etc.

7. The telephone organizations participating in SSS will provide additional thrills to subscribers of this service. DX-peditions will be formed on a regular basis and sent to rare areas of the world. Each day the computer will select several SSS operators throughout the world as "daily specials," and weekly and monthly specials will be selected in the same manner. All of the awards made famous in amateur radio, such as WAC, DXCC, WAS, RCC, etc., will be available to SSS operators on the same basis.

8. No license will be required to subscribe to SSS. There will be no problem of QRM, blackouts, or TVI.

The ONIT report concludes that the special subscriber service will offer all of the thrills of amateur radio at a fraction of its cost. It points out that there could be as many as a million subscribers to this service within a year or two, and that it would be clear profit for the telephone organizations since the master computer would connect two SSS phones along a routing that would otherwise have not been in use.

Well, dear readers, what do you think? For once in my life I must admit that I am confused and cannot think clearly. SSS sounds very interesting, and it may be the answer to some of the problems that face amateur radio. It will certainly provide many of the thrills of amateur radio, and it will be cheaper. Everyone will be using the same equipment, so the "high power boys" will no longer be able to hog all of the choice DX. Goodby also to QRM, TVI, propagation problems and licenses. It really gives a break to the fellow who wants to become a radio amateur but can't pass the license examination. No need worry about frequencies either; just leave the routing to the telephone company's master computer.

It sounds fine, but there is something about the proposal that doesn't smell right to me. Is this really something that may benefit amateur radio in the future, or is this another one of those Wickfen, Kitzler and Richard schemes to make more money for the telephone companies?

During July of this year, ONIT will hold its next Plenary Assembly, at which time the SSS proposal will be put to a vote. Dr. Wickfen has told me privately that he is confident that it will be approved, and that SSS may begin as early as the end of this year. What do you think about it dear reader? Should we, as radio amateurs, support or denounce SSS? Please send your comments to me c/o *CQ*. I will be attending the next ONIT meeting, and I assure you that I will make the feelings of radio amateurs known there. ■

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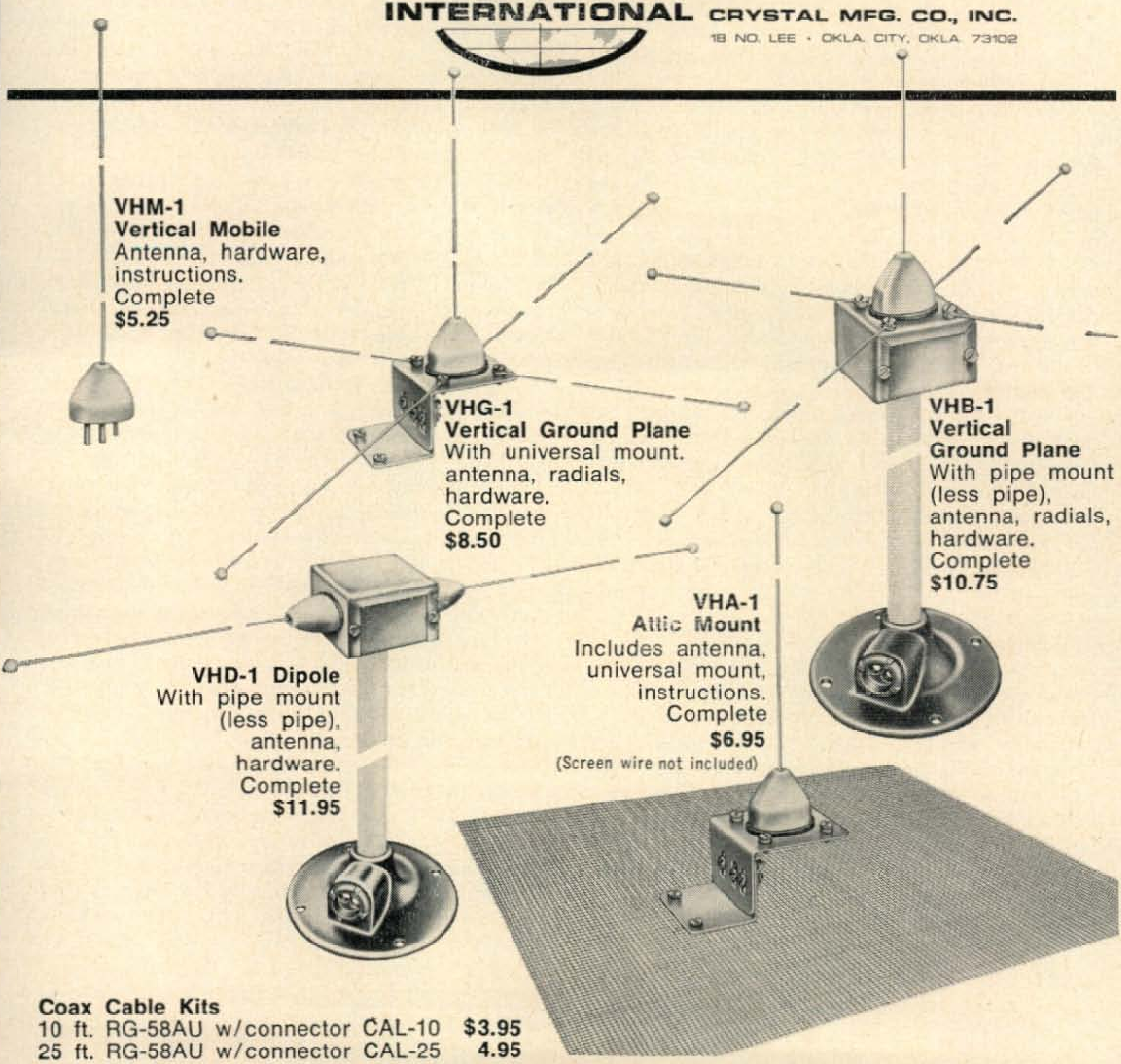

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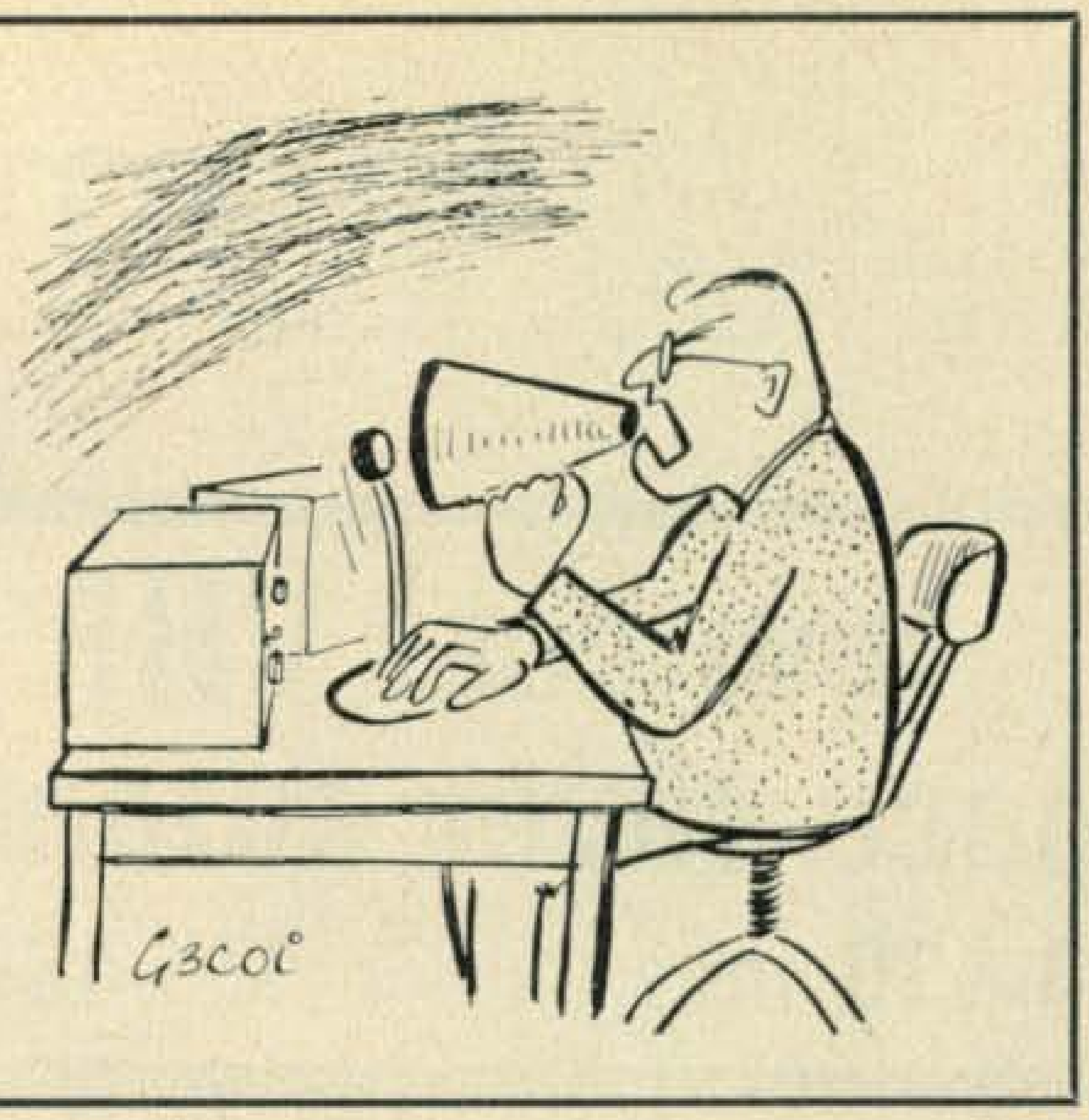
For further information, check number 22, on page 110

GRUMBLES

by Sam



BUY stock in the company that makes *Compoz* pills—from my purchases alone, you'll be a rich man. I wanna tell ya, baby, I'm really steamed! I went out and bought a *Super Duper Frammis Mark VIII* antenna with all kinds of elements, Epsilon Sigma matching sections, transistorized and steam powered front to back ratio, loading traps, better mouse traps, anodized bullet proof aluminum construction, and whatever.

Of course, my dealer didn't have one in stock and it had to be ordered—took about six weeks for the little darlin' to arrive. When he called to say that it had finally turned up, I almost had a heart attack; and when I went down to drag it home I almost got a hernia.

At home, in the confines of my back yard, I spread out the 1001 assorted gleaming pieces—carefully erecting all manner of snotty and sombre signs threatening instant karate chops to any of the neighborhood delinquents who might stray within swiping distance.

Checking all of the components against the parts list I noticed that one of the little plastic bags with some nuts and bolts was missing. Grrrrr. Oh well—Murphy's Law!

Sending a respectful letter to the maker of the multi-element monster, I had to wait another 3 weeks for the reply. All this time the crabgrass and earthworms were having themselves a ball in the damned thing.

When the moment of truth arrived and construction was started, would you believe that there were screw holes in the antenna for which there were no screws (although screws were called for in the instructions), moreover there were innocent looking *apparent* screw holes for which there were neither screws nor instructions. What's even worse is that there were several screws supplied which weren't listed on the parts list, plus a few more which were on the parts list but didn't seem to go anywhere according to the instructions.

Like any good ham, I made the best of the situation and put the rotten beast together the best way I could—without the instruction sheet.

Were they figuring on my ability to do this when they designed this bomb? Do I now qualify for a job preparing income tax forms because I have passed the test of steel (or aluminum, as it were)? If this had happened to me exclusively I would have just written it off as another case of "Why do things *always* happen to me?"

Kicking it around with some of the other guys I find that very few hams indeed have ever purchased any type of major ham gizmo which didn't come either short on parts, long on parts, or with an instruction sheet which was incomplete, confusing, or poorly planned.

This is especially finky when it comes to an electronics kit, where you can't fake it by ear as easily as with an antenna. Did you ever find that they left out an 83.2 ohm resistor that can't be obtained locally (this discovery usually is made on the Friday before 3-day weekend, sometimes it coincides with a toothache which also cannot be helped for several days).

When you finally dig up the scrap of carbon you start construction, a layer at a time, following the good book like you are told. When you get through to layer number 3 you find that, for no earthly reason, you are informed that something gets connected to a terminal strip mounted to the chassis—beneath layer 1. To accomplish this you would have to be a skinny contortionist or else be willing to rip out *this* many connections. On the other hand, you might improvise a bit and make the connection somewhere else —but if you have my luck you'll make the one choice for your connection where it looks OK in theory but will knock you on your arm when you turn the thing on.

Of course, the opposite of two *few* parts is equally miserable. One kit manufacturer always drops in a few extra components (capacitors, resistors, washers) as unannounced spares. He seems surprisingly unconcerned about the fact that when you finish building the project and find leftovers you're going to figure that you blew the whole bit. I figure that if I build about 85 of these "extra baggage" kits I'll be able to add a transformer and a few tubes to the jetsam and come up with a nifty full gallon linear.

[*Continued on page 100*]

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*c/o *CQ*, 14 Vanderventer Ave., Port Washington, L.I., N.Y., 11050.

THE ULTIMATE IN AUTOMOBILE ALARMS

BY JOHN W. CRAWFORD, *WA4SAM

THERE have been many alarm systems for automobiles; some were simple, some complicated, some effective, others not so effective. Basically they use the door button to trigger an external relay, or an existing relay in the automobile circuit such as the horn relay. (See fig. 1.) By closing S_3, which may be a key switch, the alarm is set and opening the car doors will trigger the alarm. Unfortunately any thief will instinctively close the door immediately, thereby shutting off the alarm. If he waited and saw no one coming he could hurriedly open the door again, jump inside, and shut the alarm off by closing the door again. Then at his leisure it would be a simple matter to disconnect the cabling and make off with the equipment.

Latching Circuits

Another system uses the same basic circuit with the addition of a latching relay. The horn now keeps on blowing even if the doors are closed again. Here too, the thief has only to wait in an inconspicous place, if he is so disposed, until he is sure no one hears it and then go to work. Anyone within range of the horn will think that it is a stuck horn button and won't bother to check. The luckless owner will return to find he has a quite dead battery as well as no more mobile gear.

A Shocking Innovation

There are various other circuits—a model "T" shocking system which is the original method of permanently clearing the neighborhood of children and dogs, or a high current switch in the battery lead and good locks on the gear (which doesn't prevent that portable radio from disappearing).

Ideal System

With all this in mind, I set about trying to design an effective alarm which 1) wouldn't run down the battery after the thief was scared away; 2) would provide a pulsating signal to the horn and lights to do away with the "stuck horn" illusion (other people coming to see what the commotion is can be helpful in warding off thieves); 3) would have some sort of out-of-the-ordinary noisemaking device to attract attention; and 4) be relatively inexpensive.

The circuit in fig. 3 is what I finally came up with. The leads from the relay box marked PULSATING D.C. go to the horn and the lights and the one marked STEADY SIG goes to the trunk of the car and is attached to the positive lead of a portable tape recorder. This recorder has an endless tape on it—about 14 inches of tape spliced together at the ends so that it keeps on repeating—and is hooked into an existing PA system which I have under the hood.

When the alarm is triggered there is a delay of about a second due to the action of the flasher. Then the horn gives a series of short bursts as the headlights flash off and on. Simultaneously there is a loud "Hey you!", then "Help! Help! They're stealing me! Stop him stop him STOP HIM! Stop that thief. Help police. Police, police, POLICE. Help! They're-stealing-this-car-they're stealing-this-car," then the tape starts all over again. About three minutes later if the doors are closed still, the alarm shuts off and resets itself. Assuming the thief has enough nerve to get into the automobile, the alarm will continue because of the microswitches under the seats.

For those who don't want to use the tape recorder idea, anything else can be used. Electronic sirens or even the mechanical type connected to the "PULSATING D.C. OUT" terminal, bells, or a radio controlled transmitter which will turn on an alarm wherever you happen to be at the time, can be used.

Construction

There are a few things which should be observed. The Minibox in which the relay, diode and flasher are mounted should be put inside the car away from the weather. One rainy day the thing went off while I was in the middle of

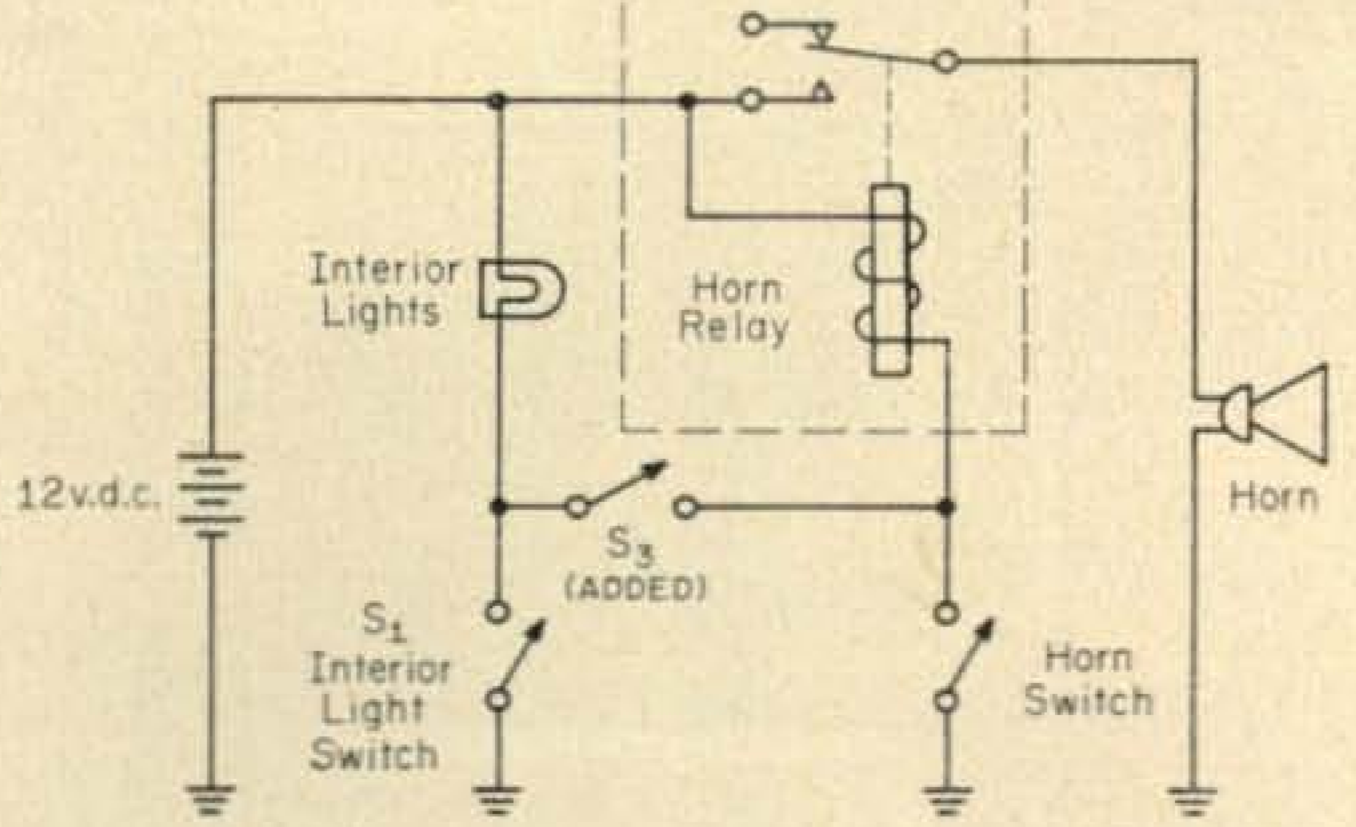

Fig. 1—Basic car wiring requires the installation of S_3, a key switch, for a simple alarm that operates the horn only when the door is open.

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*Box 13, Berryville, Va. 22611.

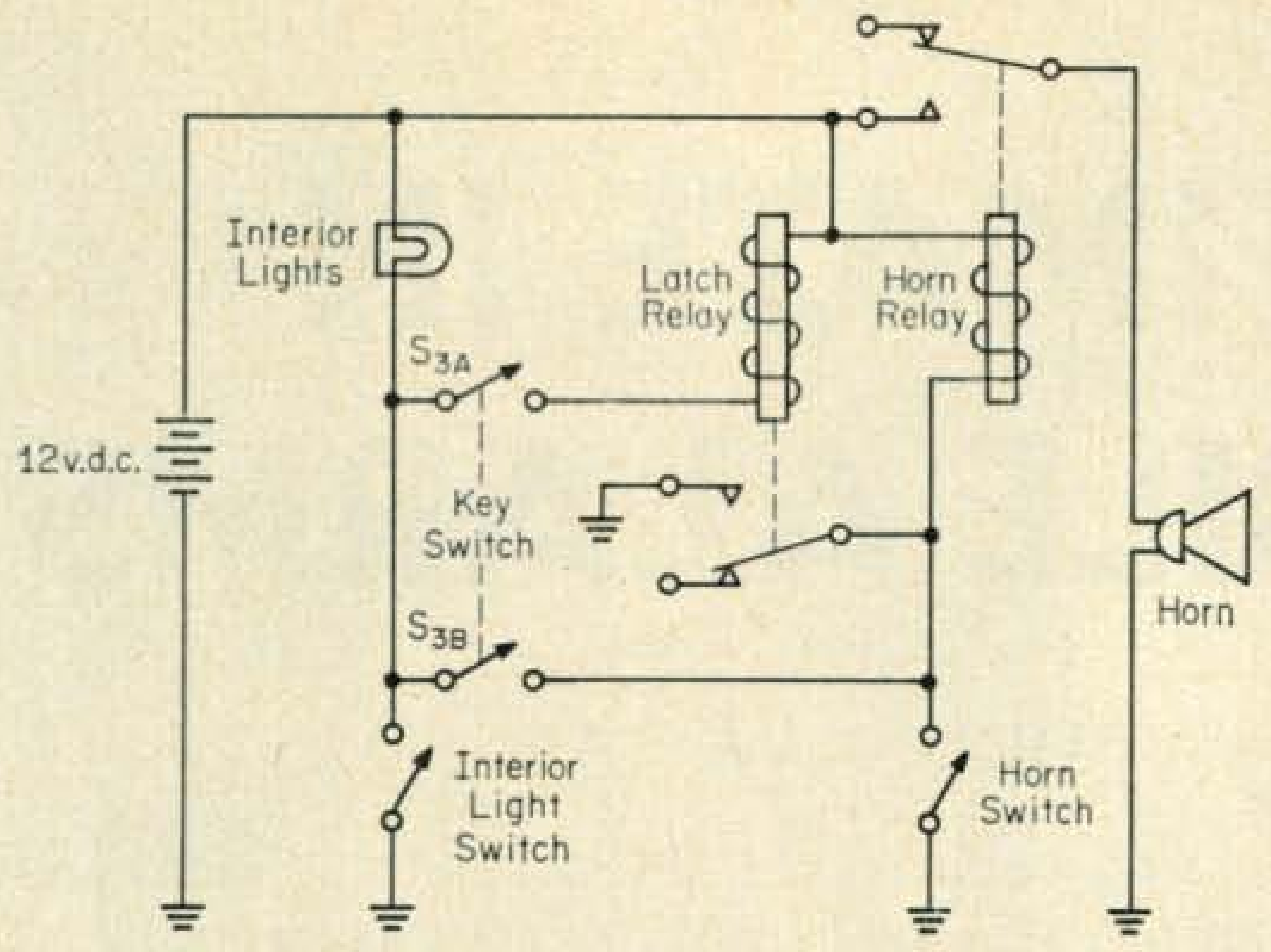

Interior Lights
Latch Relay
Horn Relay
S_{3A}
12v.d.c.
Key Switch
S_{3B}
Horn
Interior Light Switch
Horn Switch

Fig. 2—An alarm system similar to that of fig. 1 but using a latching relay.

town. Also the key and reset switches should be mounted on an inconspicous part of the car away from the weather. Under a wheel housing is poor because of the spray from the wheel. I mounted mine in the grill behind a partition where bugs, water, etc., won't get to it. In addition I taped it securely on the rear to prevent moisture from getting inside. The reset switch is a spring loaded normally-on toggle type mounted near the key switch. The delay relay is an Amperite 6C180 with a 180 second delay at 6 volts. Twelve volt units seem to be unavailable so I used a dropping resistor. By varying the value of this resistor the alarm could be run even longer if desired. Some may want to leave this out of the circuit for the only disadvantage lies in the fact that the recovery rate, (the time the relay takes to cool and thus close again) is a possible compromise. If the door is opened and a piece of tape is used to hold the button in the alarm will then shut off after three minutes. By avoiding the microswitches in the seats the thief can still get in. Admittedly it will take a thief with lots of nerve but in deserted rural areas this could happen.

Relay K_1 should be a high current type rated at least 10 amps. The door switches which turn on K_1 are the usual grounding type. Since none were used in the car's trunk or motor compartments I had to install them on brackets. It is a good idea to put them as far away from the hinge as possible. The farther away they are the less distance the hood or trunk cover has to open to activate them. They are hooked into the interior light circuit; I thought it of little importance that these lights would turn on when the trunk or hood were opened.

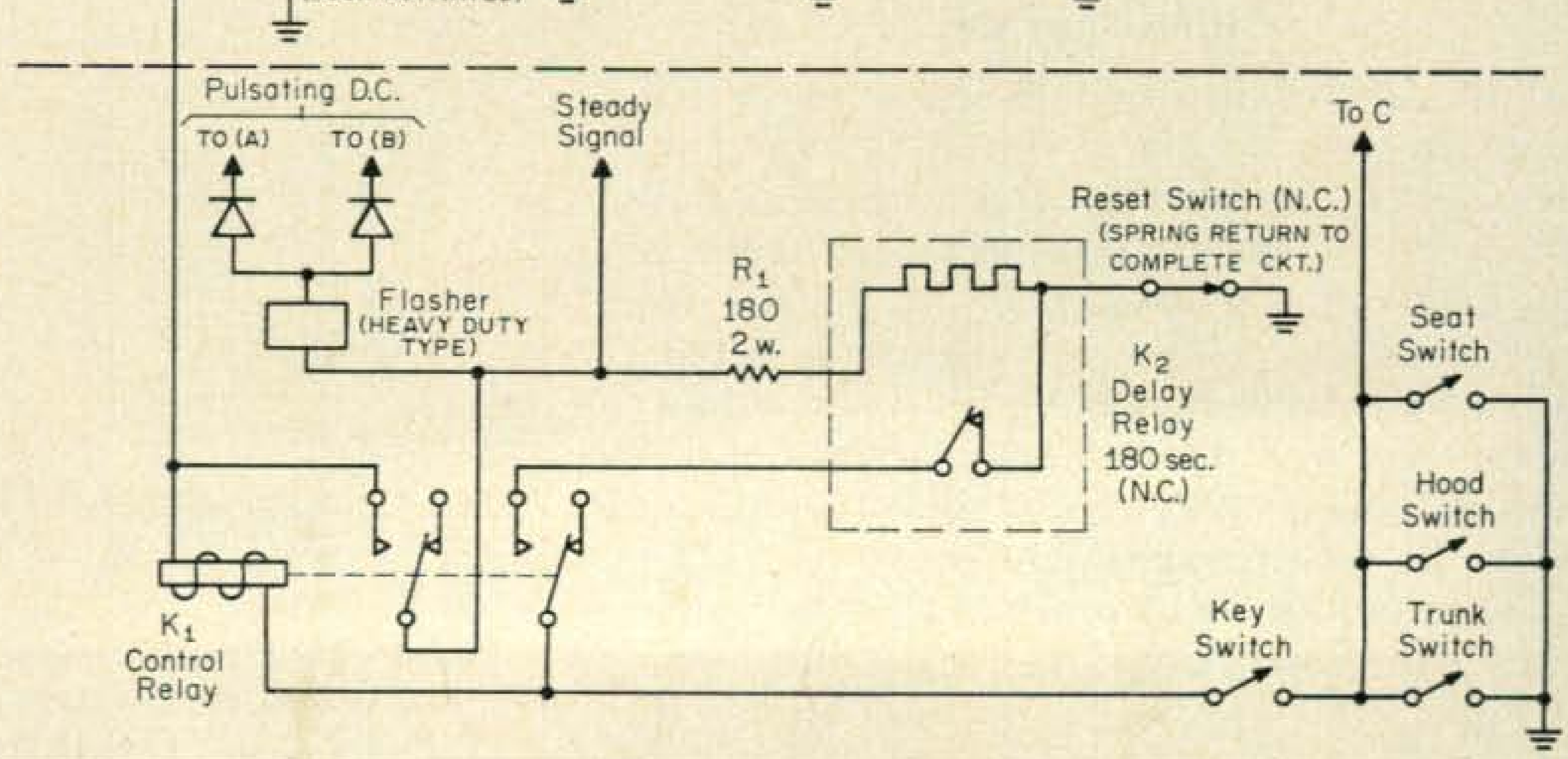
The microswitches should pretty well cover the seating area of the car. Three switches in the front and rear seats and back rests will work. If you have bucket seats try one at each side. An arm lever type will fit between the coil springs and should be adjusted for minimum clearance so that a slight touch will activate them. I used tape to hold them in place but a bracket made from a strip of aluminum would seem to work nicely.

Results

In my location at work there have been two instances in the past year when I have been called upon by the commotion to reset the alarm and I think the small investment I put into it has been more than worth it. The second time, possibly due to the warning sign I have in the window, the thief tried to break the window and reach in through it, but he must have touched the seat and triggered the alarm. At any rate he was scared off and the insurance paid for the window.

That's about it. If you install this your car and equipment will never be stolen. It also seems to be the answer to police towing. Can you imagine the poor guy in the tow truck as he tries to tow something like this down the road? ■

Fig. 3—Circuit of a comprehensive burglar alarm that flashes lights, interrupts the horn and announces the impending theft over a PA system. All wiring should be done with heavy duty #14 except for the key, door and trunk switches. These may be #20.


Horn Relay
12v. Battery
(B)
Interior Lights
Headlight Switch
Existing Automobile Wiring—Simplified Schematic Diagram
(C)
(A)
Interior Light Switch (DOOR ACTIVATED)
Headlights
Horn Switch
Horn
Pulsating D.C.
TO (A)
TO (B)
Steady Signal
To C
Reset Switch (N.C.) (SPRING RETURN TO COMPLETE CKT.)
R_1 180 2 w.
Flasher (HEAVY DUTY TYPE)
K_2 Delay Relay 180 sec. (N.C.)
Seat Switch
Hood Switch
Trunk Switch
Key Switch
K_1 Control Relay

CR_1, CR_2—Silicon diodes, 20 Amperes, 50 p.i.v.
K_1—Relay, d.p.s.t. 12 volt coil, 10 amp contacts.
K_2—Thermal time delay relay (normally closed), 180 seconds, 6 volts. Amperite 6C180 or equiv.

International Mission Radio Association News

BY TOM AQUINAS COX, O.F.M. CAPUCHIN W2CBX*

THIS month, I can't help but endorse the comments in Charles J. Schauers' "Ham Clinic" which appeared in the February issue of *CQ*. In the article he has drawn up a list of "advantages of amateur radio" that I think we all have to cheer.

The advantages of amateur radio, as he points out, have to be proven to many people throughout the world. I think we all have to do our part to publicize these good qualities of amateur radio. I hope we will all respond to his plea by some positive action; send a dollar to ARRL, support IARU, IAOR, LARC or some other group, but do something.

IMRA, another, but new, International Association wants to do its part. I am sure I speak for all of our members when I say we will do our best to support any good and united effort to maintain the establishment of amateur radio.

IMRA doesn't want to compete with any other group. IMRA wants to enhance, by its activity, the total picture of amateur radio. We hope to do this by stressing the importance of person-to-person contacts especially on the international level, and providing international communications service for all those overseas who are working to help their fellow men. We want to support these people with amateur radio communications and equipment. IMRA wants to spread the advantages of amateur radio all over the world.

During the past three months I have had the pleasure of introducing you to some of these good will representatives of amateur radio from all over the world. Perhaps you can do your part for amateur radio by working with IMRA. We all, apparently, have a lot to prove about amateur radio. IMRA will afford you the opportunity to express your desire not only to see amateur radio continue in existence, but also to help develop its future and advantages.

Communications Service Established

For the past three months IMRA has been working to fulfill its goal of providing a convenient and rapid International Communications Service. This network will be made up of stations all over the states. The present system is designed to provide phone patch communications for those representatives of amateur radio in Latin America.

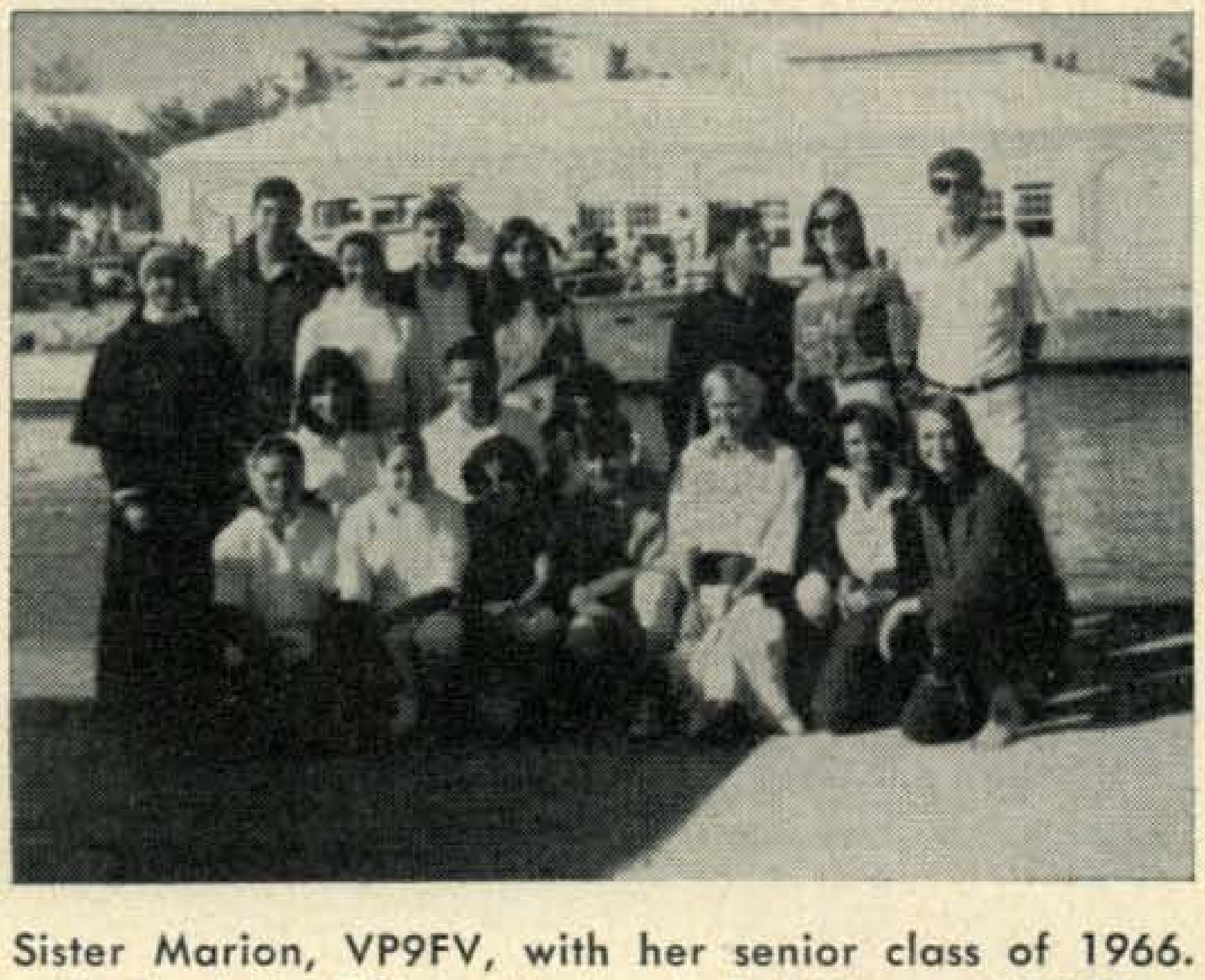
The initial system is admittedly small. IMRA, like Rome, is not being built in a day. However, our future looks great. The present communications service for Latin America meets on the 20 and 15 meter bands (14.270 and 21.393) every Wednesday at 1830 GMT.

Knowledge of the service is just spreading to interested persons in Latin America now. Before long, we can expect to have a daily service operating many hours each week.

As the demand grows, we will have to supply more extensive service here in the States. We will need the help of hundreds of interested amateurs here in the States. We will need people who can spend an hour or two or more demonstrating the advantages of amateur radio.

Equipment

I have mentioned before, that IMRA is trying to supply equipment to people who need it. This purpose is, I am sure you will agree, a difficult one to fulfill. Yet, we don't want to close our eyes to the fact that there are many men and women overseas who need our support to teach high school students the wonders of amateur



Sister Marion, VP9FV, with her senior class of 1966. To the left of Sister Marion is Ted Pitman, VP9EP.

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*Mary Immaculate Friary, Garrison, New York.

Murrill Burton, K4LGP, Convention Chairman, with his sister Gretchen, W4RTH.

radio. With their training in radio these youngsters will acquire an important science and technology that will help not only the cause of amateur radio but also the development of their own country.

There are others too who need equipment to establish and maintain communications between outposts in developing countries, eg., Padre Luke Lafleur, HI3XLL; Brother Pat, TG5HC; Paul DeSmet, 9U5DP. IMRA, in conjunction with other organizations, wants to try to fulfill these needs. We will have to depend on your support, equipment and most of all at this point, your ideas.

IMRA Convention '67

The next annual business meeting and convention of IMRA will be held in Ashville, North Carolina on August 7th & 8th. At this meeting IMRA will be re-thinking the means of achieving its goals. We will be trying to devise better ways of becoming an effective and advantageous part of amateur radio.

Be on the lookout for more information concerning the convention. May I at this time, however, extend an invitation to you to join us this August in Ashville. The convention chairman is Mr. Murrill Burton, K4LGP, 1008 Mendenhall St., Thomasville, North Carolina 27360. He will be glad to make arrangements for your attendance.

From The Field

Sister Marion Edward, VP9FV, is a fine example of a dedicated teacher and an enthusiastic amateur. In her science class she has introduced many students to radio. On one occasion, a student was recuperating from a serious accident at home and could not attend class. Sister solved that problem quite easily. She brought class home to him—via amateur radio. Poor Ted, VP9EP, probably thought he'd get a little rest. Physics class on the ham bands!

Sister Marion is the only licensed YL in Bermuda. Among other activities, Sister is a member of YLRL as well as YL SSB'ers, a teacher, Secretary of the Bermuda Schools Sports Federation, and Secretary of the Bermuda Astronomical Society.

Bermuda isn't exactly what one would call a developing area, yet amateur radio is of great service to her. Marion hails from Boston and she likes to keep up with what is going on back home, both for herself and for the 18 other Sisters with her. She says the moral support of Amateur radio "does wonders."

Just a few hundred miles away from beautiful Bermuda, conditions are quite different. Amateur radio here means not only a moral support, but a vital link between stations in the bush country of British Honduras.

Phil Pick, VP1AB, (ex W0RUI-W9NXT) feels IMRA can be of service by "improving international good will, sharing experiences and expediting communications." As for communications, Phil and his fellow missioners, VP1FR, VP1CL, VP1LY, VP1XX and VP1SA are on the air daily at 7.225 mc. These men are involved in the operation of 95 primary schools and 9 secondary schools. Since telephone communications are almost non-existent, radio is a must to coordinate this large operation. The use of amateur radio for Phil and these other men, means friendship, immediate service in emergency situations, and education for the people with whom they work.

Phil, VP1AB, has on two occasions been able to use his station to avert disaster and loss of life during hurricanes. For his work in 1955 and 1961, Phil received recognition from officials of various Governments, the Red Cross, ARRL, and the President of Tropical Radio.

Phil wants to see IMRA grow and help him and others with communications and to introduce those in situations similar to his to the advantages of amateur radio. Look for Phil on 40 meters as well as on 10, 15, and 20. He says he just "likes people," and he would like to speak with you about the future of IMRA.

In the February Issue of *CQ*, I mentioned to you that Brother Pat, TG5HC, was looking for an a.c. power supply for his SR-160 and a beam antenna. Well Pat now has the power supply, but is still looking for a beam. Who can help him out?

If you think that IMRA is an organization in which you can express your dedication to amateur radio, let's hear from you. IMRA is publicizing the advantages of amateur radio by serving those ambassadors of amateur radio serving their fellowmen in foreign lands. I hope you will join us. Have a part in our activities. ■

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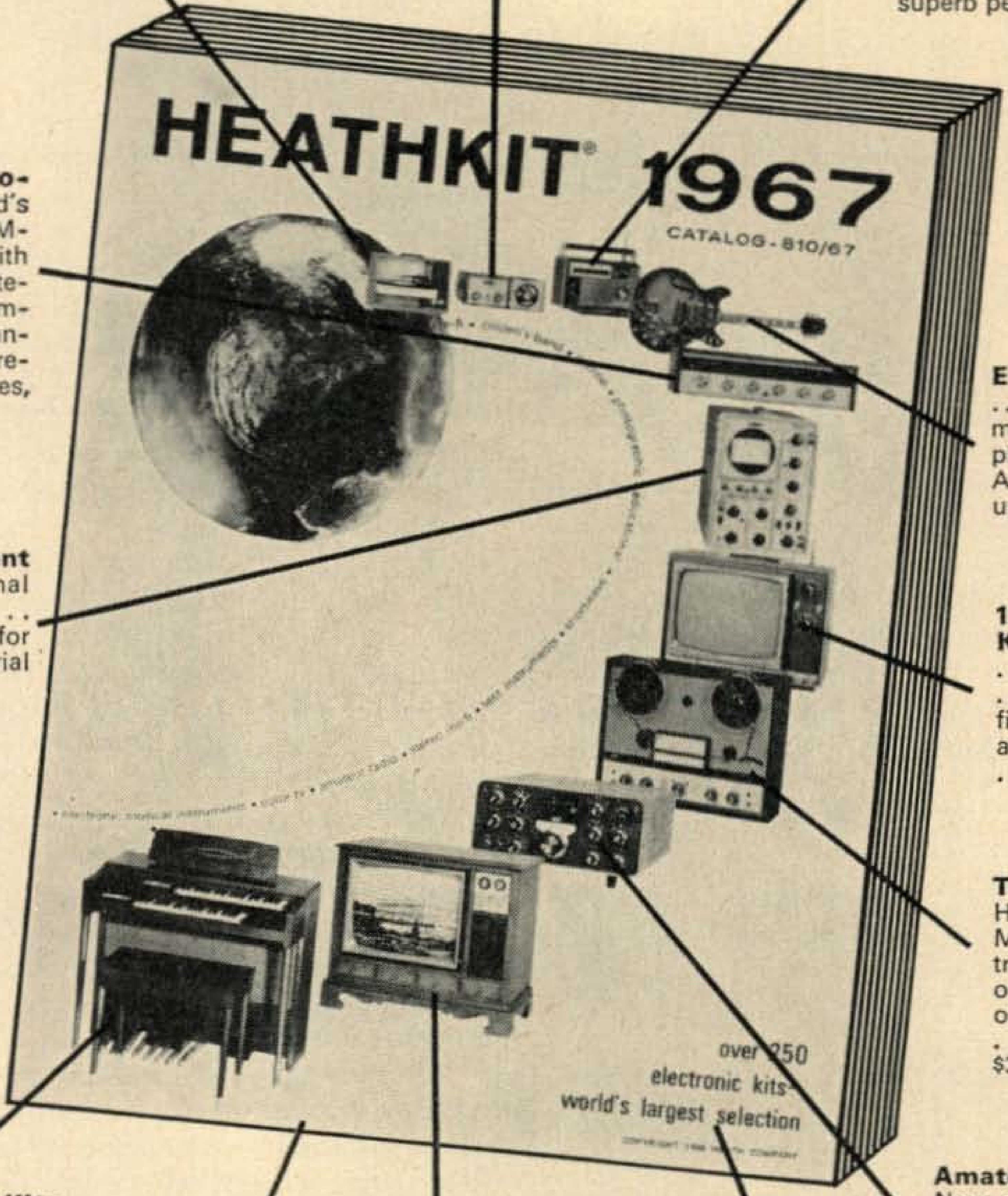

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For further information, check number 1, on page 110

Skin Effect In High Frequency Design

BY JOSEPH TARTAS,* W2YKT

THE electronic design engineer has a myriad of problems to consider when he gets above a megacycle or so. Foremost of these is the r.f. resistance of conductors, and the closely related skin effect.

Skin effect is a phenomenon in which the r.f. current in a conductor tends to travel closer and closer to the surface as the frequency becomes higher and higher. At a sufficiently high frequency, the conductor need no longer be solid, and in the frequency range where the wavelength is measured in centimeters the entire conductor is essentially a plating less than a few thousandths of an inch thick. Because of this it becomes possible to water-cool a high power, high frequency tank coil by making it of tubing and running water through its center. It also allows the construction of flexible waveguides (among other devices) since the conducting surface only, carries the current. The rest of the waveguide can be a conductor or non-conductor, either flexible or rigid, without altering the electrical characteristics.

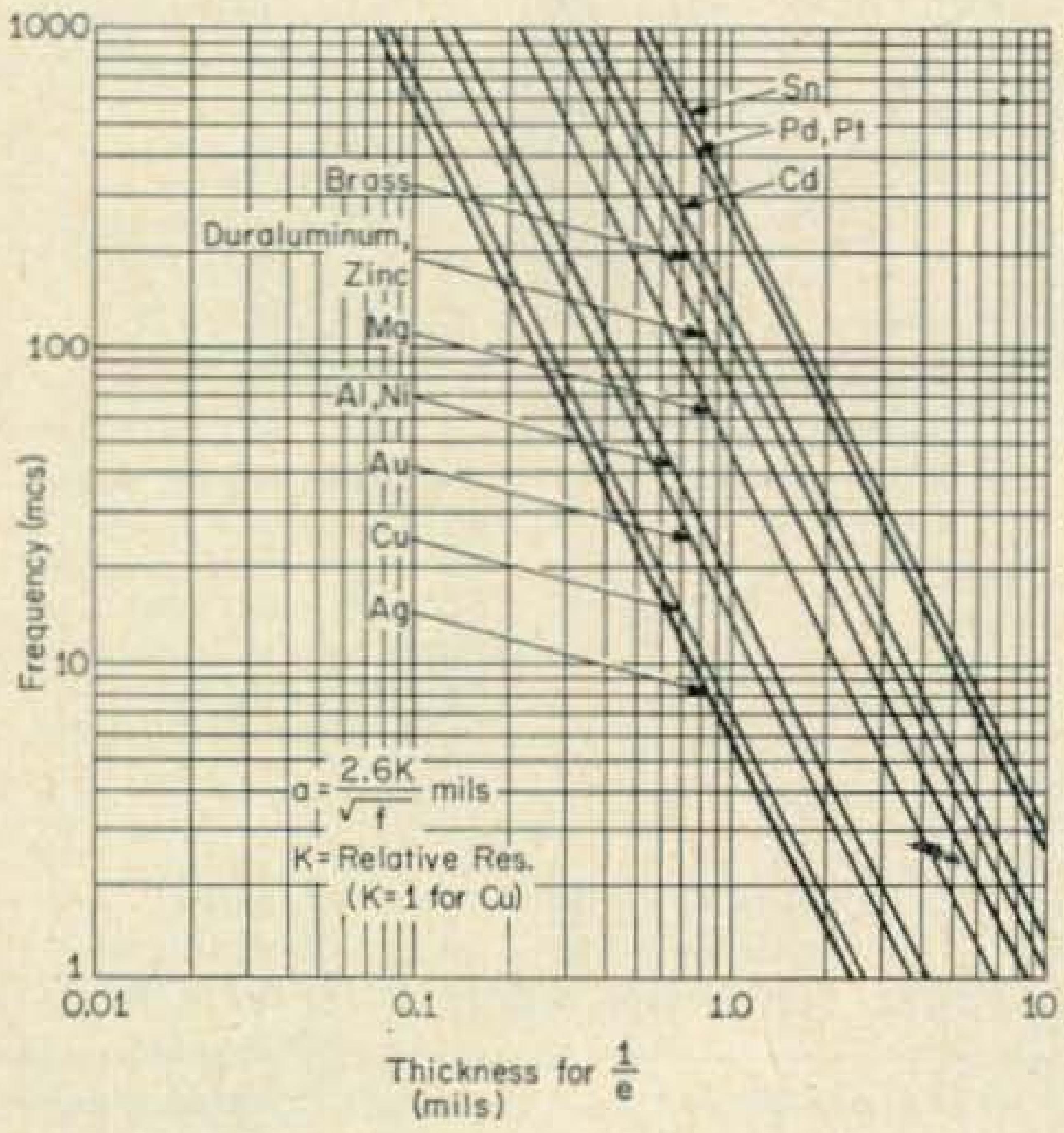

Fig. 1—Plot of frequency versus required skin depth for various metals.

Al — Aluminum
Ag — Silver
Au — Gold
Cd — Cadmium
Cu — Copper

Mg — Magnesium
Ni — Nickel
Pd — Palladium
Pt — Platinum
Sn — Tin

Skin Effect Cause

The skin effect is caused by the greater linkage of magnetic flux lines near the center of the conductor. As in any type of inductance, coil or straight wire, the amount of inductance depends upon the number of flux lines linking the conductor or turns, and the rate at which the field fluctuates. As the inductance increases towards the center of the conductor, so does its inductive reactance (which is essentially an a.c. resistance).

We know from Ohm's Law that a d.c. current will flow through the path of lowest resistance (and from nature as well, in the case of lightning). R.f. currents are no different in this respect. Hence, if the reactance becomes greater as the center of a conductor is approached, the r.f. currents will tend to flow on the surface.

However, due to the skin effect, the r.f. currents are always redistributed over a cross section of the conductor, *regardless of its shape,* so as to flow along a path where the reactance (or impedance) is lowest. In most cases the d.c. resistance is negligible, and the impedance is for all practical purposes, the same as the reactance.

The r.f. current intensity falls off at a rate of $e^{-z/a}$ where $^{-z/a}$ is an exponent at higher frequencies, where Z is the particular depth at which the current is flowing, and a is the skin depth. Thus, at one depth, a, the current is reduced to $1/e$, or approximately 37% of the current density at the surface, due to the r.f. resistance. The quantity a, of course, depends upon the resistivity of the conductor material (and to an extent upon its magnetic permeability) so that the depth of the skin must then depend upon several factors: (a) the frequency, (b) the resistivity, (c) the permeability, and (d) the amount of conductivity (or r.f. resistance) the circuit requires or can tolerate.

For a given resistivity p, the skin depth

---

*1204 Ringwood Ave., Haskell, New Jersey 07420.

$$a = 5033\sqrt{\frac{p}{\mu F}}$$

where:
p = is in ohms/cm^3
F = is in cycles
μ = permeability
a = depth in cm

To eliminate the necessity of complicated calculations each time a material or frequency is to be selected for design, a chart has been made to cover the largest number of useable conducting materials, over a fairly wide frequency range. This may be further extended by extrapolation.

The values from the graph (fig. 1) represent the depth at which the currents will be reduced to $1/e$ (where e=2.302) of the surface currents, and it is customary to provide for at least 5 times the skin depth shown. For all practical purposes, 5 times is close to 100% conduction. Because a plot of percent conduction versus skin depth is an asymptote, similar to that of a curve for RC time constants, 100% can never be attained, although 4.6 times the minimum skin depth represents 99%.

Although steel in some form or other is occasionaly used as the base metal, it is not included in the graph because the resistivity varies between 7 and 15 for most common alloys, and as high as 52 for stainless. Since a plating is usually used at higher frequencies anyway, the resistivity of the plating material is of greater consequence.

Although there are many metal elements and alloys, only those normally used or suitable for conducting surfaces are shown. The rarer of the precious metals such as palladium, iridium, or rhodium when used as a flash over silver or silver plating is so thin as to have negligible skin effect, and is used solely to prevent tarnishing or corrosion of the heavier plating that is intended as the actual conducting surface.

These metals usually are limited to a flash, because they are brittle and have a tendency to flake off when more than a few tenths of a mil in thickness. A heavy copper plating with a thin silver or gold plating or a flash of a more exotic metal will provide a good conducting skin with an excellent environmental protection. If the flash or plating is properly done, no galvanic action can take place, since this requires the pentration of the outer layer by the electrolyte solution. (This is essentially a battery, with the two dissimilar metals acting as plates.)

Noble Metals

Platinum, palladium, and gold have the unusual property of corrosion resistance to surrounding atmospheres (hence, noble metals). They assure good electrical contact even under light pressures and can maintain low contact resistance without oxidation at high temperatures. However, because of their high cost, they are usually used only as a protective plating or flash. Most commonly encountered conductors today are steel, copper, brass, or aluminum, with steel and brass actually taking a back seat to aluminum because of improved metalworking, casting, and plating techniques.

Protected end (cathodic, or most noble).

Platinum
Gold
Graphite
Silver

18-8-3 Stainless (passive)
18-8 Stainless (passive)
Chromium-iron (passive)

Inconel (passive)
Nickel (passive)
Silver solder

Monel
Copper-nickel alloys
Bronzes
Copper
Brasses

Inconel (active)
Nickel (active)

Tin
Lead
Lead-tin solders

18-8-3 Stainless (active)
18-8 Stainless (active)

Ni-Resist

Chromium-iron (active)

Cast Iron
Steel or Iron

Aluminum 17ST

Cadmium

Aluminum 2S

Zinc

Magnesium alloys
Magnesium

Corroded end (anodic, or least noble).

Table I—Positions of metals in the galvanic series. Grouped metals indicate they are similar in properties. From, *Reference Data For Radio Engineers, ITT Corp.*

Because silver does not adhere to aluminum, a coating of copper is usually applied first, and if the frequency is high enough, it need only be very thin, the silver plating being thick enough to provide the needed skin depth.

When mating two metal surfaces (such as subunits in a larger piece of equipment) galvanic action can be avoided either by using similar metals on the mating faces, or metals that are close together in the galvanic series. For example, aluminum and silver are far apart, but copper plating on the aluminum brings it close to the silver plating. A thin plating, although farther away on the scale, will not corrode or tarnish, as silver will.

The skin depth necessary for a given conductor material is related directly to the resistivity of that material. Therefore, for a given frequency, the required depth may be found for any metallic skin by the relation:

$$a = \frac{2.6\,K_1}{\sqrt{F_{mc}}}$$

where: K_1 is the relative resistivity ($C_u = 1$).
a = depth in mils.

If two points are determined for F=1 and F=100, the equation is then reduced to a_1=2.6 K_1 and a_{100}=0.26 K_1 and the graph shown in fig. 1 is obtained.

Intelligent application of this information will result in equipment and circuitry with low losses and long life. ■

Announcing the
CQ Twelve Hour VHF Contest

Saturday, May 6

All amateurs equipped for the bands from 50 to 432 mc are invited to participate in the *CQ* 12 Hour VHF Contest which will take place on Saturday, May 6. This is a single-band-only contest; that is, no multi-band entries will be accepted, but you may enter separate logs for more than one band.

Contest begins at 9 A.M. local time and ends at 9 P.M. the same day.

Contest Rules

A. CLASSIFICATIONS: 1. 50 mc only; 2. 144 mc only; 3. 220 mc only; 4. 432 mc only.

B. OPERATORS:

1. Any number of operators may work together under one call. Be sure they all sign the log.

C. INFORMATION EXCHANGE:

1. Your county and state.
2. His signal report at your station.
3. Your contact number to him (numbers starting from 1).
4. Your name.
5. Typical on-the-air exchange: "Roger OM. You're 59 Union County, New Jersey. You're my number 17. Name is Bob. Over."

D. CONTACT POINTS:

All completed contacts with the required information count one point.

2. Mobile stations may be worked only once during the contest.
3. Aero-mobile and maritime-mobile contacts do not qualify.

E. COUNTIES:

1. In the United States only counties will qualify as sections.
2. In other countries the equivalent political sub-divisions will qualify.

F. HOURS MULTIPLIER:

1. One different contact during each hour of the contest constitutes a "contest hour." Example: 10 hours during which a contact was made is an hour multiplier of 10.
2. These must be NEW contacts—not repeats.

G. POWER MULTIPLIERS:

1. 25 watts input or less (a.m., c.w.), multipliers of 3.
2. 125 watts input or less (a.m., c.w.), multiplier of 2.
3. 1000 watts input or less (a.m., c.w.), multiplier of 1.
4. Sidebands entrants use above breakdown base on peak envelope power (PEP).

NOTE: Power levels should remain constant throughout the contest period.

H. SCORING:

1. Each completed contact counts 1 point.
2. Each county worked scores 1 point (toward county multiplier).
3. Each hour scores 1 point (towards hours multiplier).
4. Your power multiplier, as explained in paragraph G above.
5. Computation: Add up all your contacts, then add up all your counties; count up all the hours and write down your power multiplier. If you're running 20 watts, on the air 10 hours, and work 100 stations in 20 counties, you'll score thus:
   $3 \times 10 \times 100 \times 20 = 60{,}000$ total score. Contacts times counties times hours times power multiplier.

I. AWARDS:

1. Certificate will be awarded to high scores in each state, for each band.
2. Certificate will be awarded to the high scoring Novice in each state.
3. A "Club Aggregate" trophy will be awarded to the club whose members accrue the highest point total. Members *must* indicate on their logs that their score is to be credited also to their club's aggregate score.

J. LOGS:

1. Logs should be complete in every detail and should contain your total claimed score. Sheets should include (for a typical contact) your time in, your number, his number, his call letters, county, and his state, his name, and his signal report (as heard at your end).
   NOTE: This differs slightly from the verbal on-the-air exchange. Be sure to get all the required information.
2. A cover sheet should accompany all entries including band operated (6 meters, 2 meters, etc.), your name and address, names of other operators, and final claimed score. A letter and photograph would be doubly appreciated.
3. Logs are available free from us. Just send a self-addressed-stamped-envelope for your supply to: *CQ*, The Radio Amateur's Journal, 14 Vanderventer Avenue, Port Washington, New York 11050.
4. FINAL DEADLINE: Monday, June 12, 1967. Tuesday we start compiling results.
5. Send all logs and photographs to:

CQ The Radio Amateur's Journal
Att: VHF Contest Committee
14 Vanderventer Avenue
Port Washington, New York 11050.

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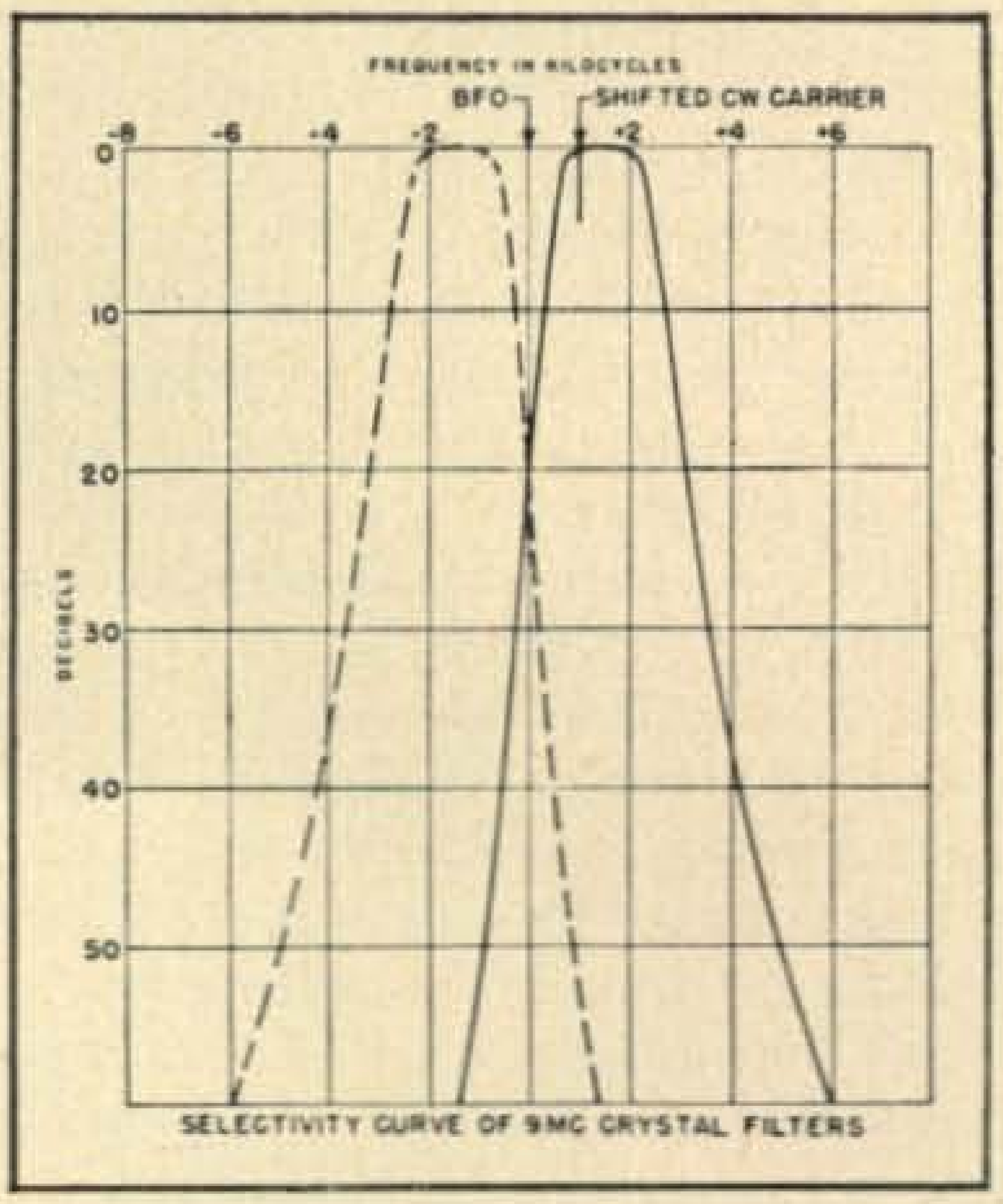

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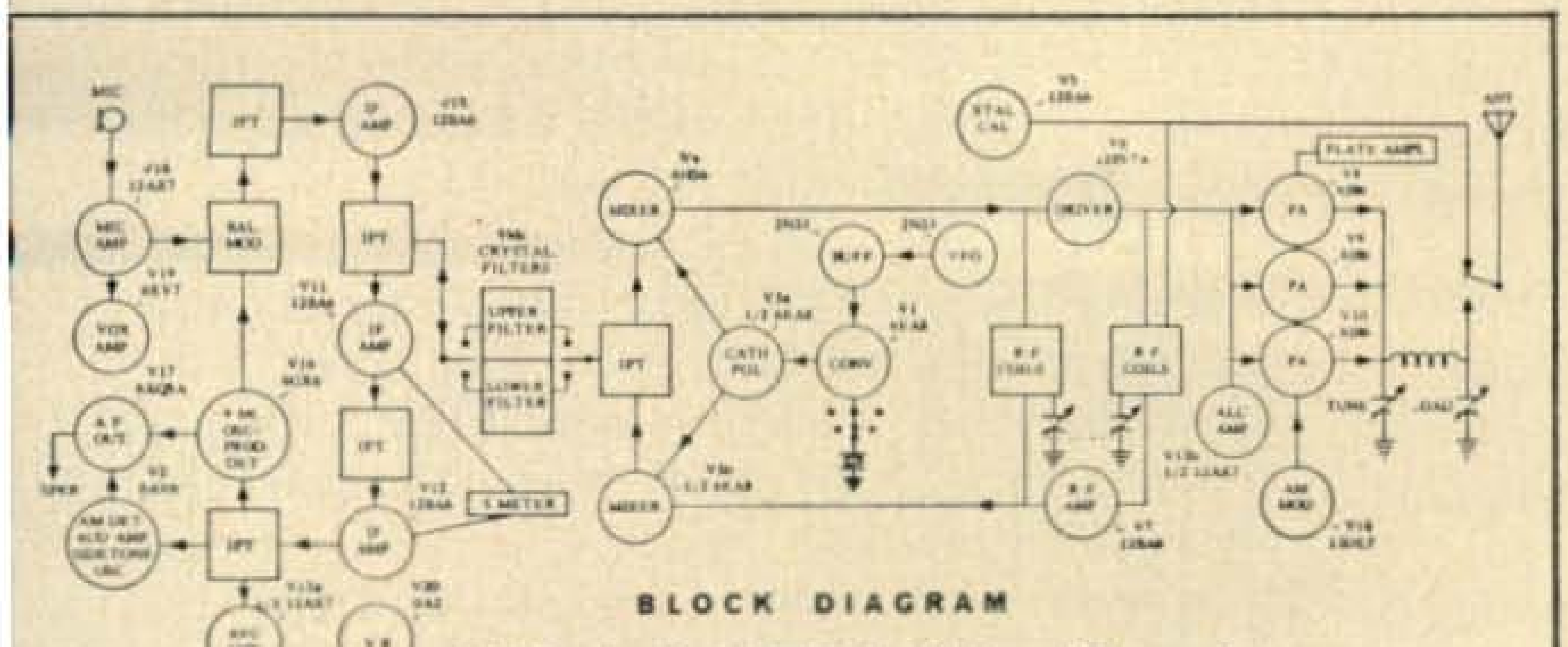
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CONVERSATION WITH A NOVICE

BY LEE AURICK, K3QAX/W2QEX

A FRIEND called the other day and asked if I would talk to his young son, who was waiting on another extension, and give him some advice as to how he should get started in ham radio. It seems this young man, just entering High School, had already obtained his Novice license, but had not yet accumulated any equipment, and was even undecided as to what band or bands he should investigate first.

David, it seems, had been introduced to amateur radio by way of the Citizen's Band; an increasingly common occurrence. Tiring of talking with walkie-talkies, at distances he could almost cover with a shout, our young man had already begun to discover that there was much more to communicating than this.

Fortunately, his steps had been directed toward ham radio, and now he was at an intersection, with many possible ways to proceed, and more than a little confused as to which avenue would offer him the greatest reward.

I quickly reviewed my qualifications for giving such advice: fourteen years an Extra Class licensee; more than twenty years as an active, licensed amateur; a thirty-two year interest in radio; formerly Assistant Secretary of the American Radio Relay League; assistance to hundreds of people of all ages in getting started; a wife, son, and two daughters who are or were licensed; formerly Technical Editor of *CQ* Magazine; and author of numerous technical articles on amateur radio. I decided to go ahead anyway.

Our conversation went something like this:

David: "The only equipment I have right now is a little transceiver for 2 meters that was loaned to me by Civil Defense. I can use it to talk to other amateurs, but the range is very limited, and there aren't too many fellows nearby that I can contact with just the little whip on the rig. Should I get some better equipment for this band, and some more crystals?"

Old Timer: "David, the only reason for having a Novice license is to prepare for the General license, and your present operation on 2 meters will likely be a dead-end to your amateur radio career. Two-meters is a great band on which to conduct experiments, local rag-chews, and CD nets, but it has been the living end for many a Novice, who had something less than Utopia for a year—and then nothing, when his license expired. Your Novice license gives you an opportunity to get on the air and learn to communicate with the basic tool of communications—c.w.—in preparation for the General Class exam. If you are able to pick-up the code by listening to W1AW, other code practice stations, or from friends, you don't need the Novice license—get the General ticket now. In any event, get off 2 meters while you are a Novice."

David: "Ok, Ok, but before I can take advantage of this Novice license, I must have a transmitter, receiver, antenna, and I suppose a few other things, but it seems to me I first have to decide which band I want to go on, since this will determine what kind of an antenna I should put up, and I haven't got room in the backyard for more than one at a time."

O.T.: "David, there are probably as many solutions to the antenna problem as there are hams. Any decision that you make at this time should not be considered as forever. Hopefully, as a well-rounded amateur, you will eventually operate upon all the ham bands. In which band do you believe your interest may lie at this point?"

David: "I just want to work all that DX on 15 meters."

O.T.: "Oh, have you been listening to the DX in the Novice portion of the 15-meter band?"

David: "No,—a friend told me."

O.T.: "DX is fun David. I work some myself, whenever I get a chance, but doing it as a Novice is not easy, and at this point why throw frustration in your path to becoming a General. Sure, Novices do work DX, you read about it all the time, because it's newsworthy. It is hard for the Novice to do, and furthermore, you'll be at school during the day when the band will be be at its best. Generally, by the time you come home, the band will have had it, and you'll be back talking to the locals. So much for the propagation factor. There is another very important point. DXing is mostly just sitting and listening to calls—not even to what guys say, so much as who says it. Your ears are set to respond to exotic calls, and not much more. What you need at this time—to really be ready for that General ticket—is lots of operating, and you won't get it as a Novice working DX on 15 meters. It takes skill to stalk DX and you will be well advised to build up some operating experience with relatively easy-to-work U.S. stations. You'll have lots more contacts, and at this point that's what you want—operating practice."

---

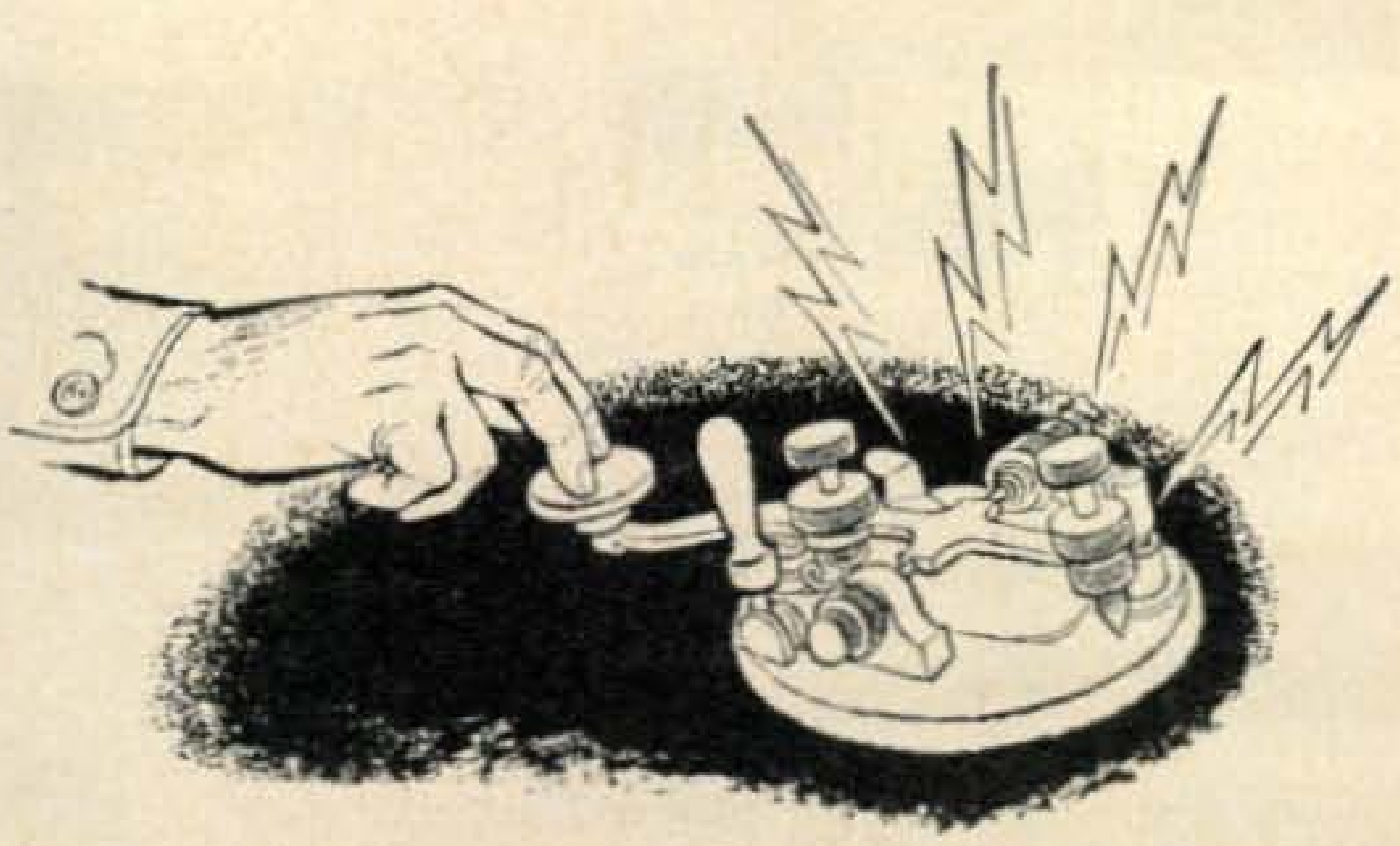
*Mt. Pleasant Road, RD #1, Columbia, Pennsylvania.

David: "Ok, so 15 is out while I'm a Novice. There are only two bands left, 80 and 40. I think I could fit a 40 meter antenna in my yard, but I don't believe an 80 meter antenna could be squeezed in."

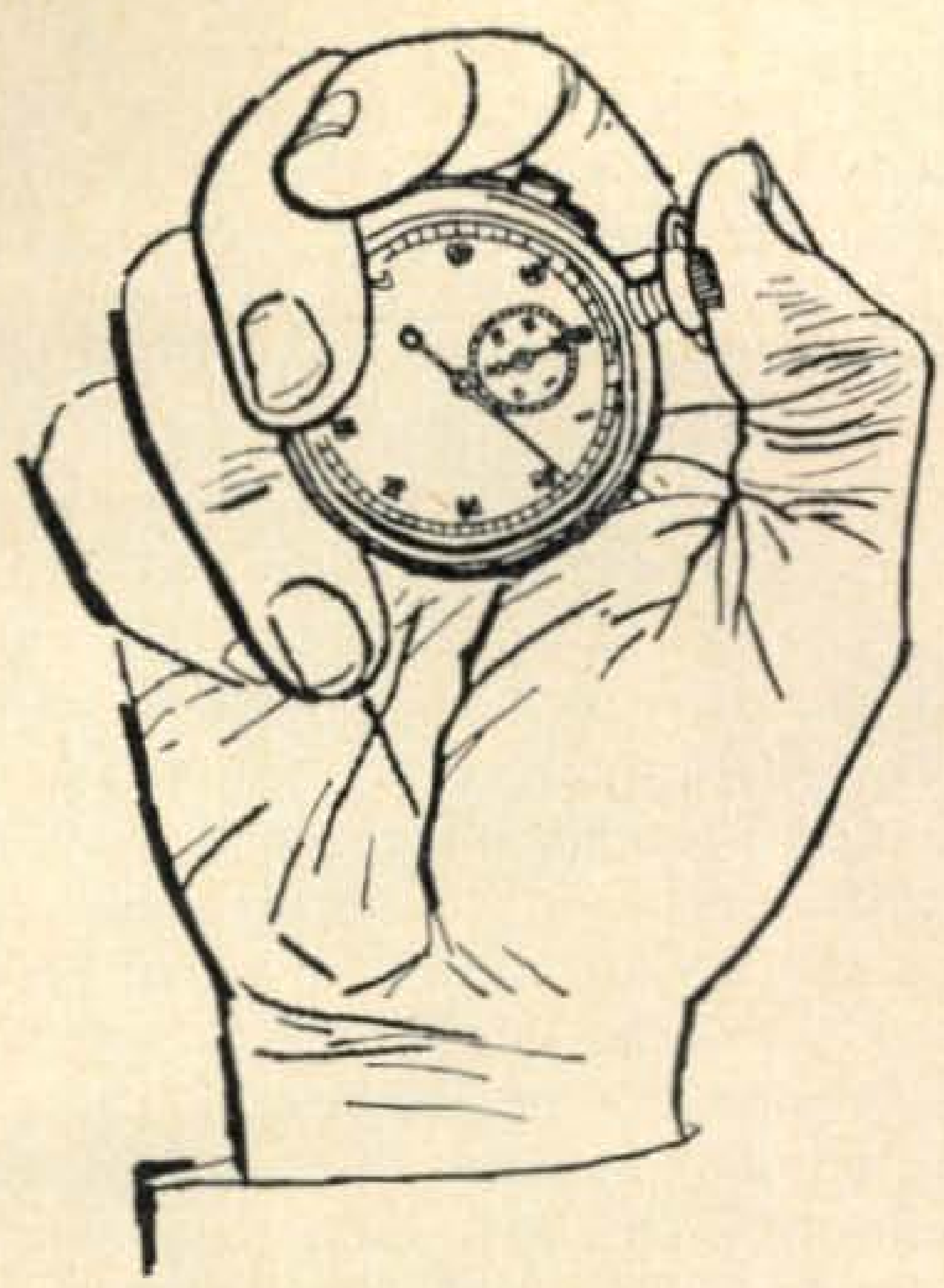
O.T.: "Remember what I said a few minutes ago, about the number of possible solutions to antenna problems. If you can fit a 40 meter antenna in your yard, there is no reason why you can't fit a special version of an 80 meter antenna there also. But let's talk about 40 meters first. Forty is a great band, there is always someone interesting to talk to, and it's rarely closed. Every hour or two a different part of the world is heard from. Remember, however, you are confined, as a Novice, to a very small and congested part of the band. You are competing not only with other Novices, but with foreign broadcast stations as well. Living here on the East Coast, this combination can well spell disaster for the operating enthusiasm of the inexperienced Novice, working with an inexpensive receiver, and without the skill necessary to obtain maximum performance from his equipment. The foreign broadcast stations (they are there legally) start coming in during the late afternoon; just about the time perhaps you would want to get on the air. Foreign amateur 'phone stations also work in this area. I know of several Novices to whom this competition was just too much; they got discouraged and quit, and David, what we want to show you at this time is results."

David: "Well the only band left for me then, as a Novice, is 80 meters. Are you telling me this is the band you recommend that I use to get started?"

O.T.: "You read me loud and clear, David. Here is a band, 80 meters, on which you can have a contact just about any time you have an opportunity to get on the air. Sure you have to put up with the interference from a lot of other Novices (certainly no more than 40 meters), but you will not have to contend with the foreign broadcast and amateur 'phone stations. As a Novice, you may expect contacts up to several hundred miles, consistently, day in and day out, any time you wish to operate. The *ease* with which you may make contacts as a Novice on 80 meters is what we are really selling on this band. The greater *participation* that you will experience will make your code speed zoom, and you'll be ready for 13 w.p.m. in just a few months *at most*. So there you have it David—the reason why a Novice license exists—to give you the all important opportunity to become proficient with the code before you're turned loose in the General Class allocations. Don't forget to watch for General Class stations, operating just below 3700 kc. Many Generals like to work here, to give a Novice a chance at working a more experienced operator. You can really profit from such a contact, and the General will slow to whatever speed you send. If you're a fast man with a key (sending, that is) then that's the way you're going to get it back. Always send at the speed at which you wish to receive."



Get on c.w.



Build up your code speed

David: "Ok so far, it's 80 meters for me. Now all I need is a transmitter and a receiver. And don't forget my problem about the 80-meter antenna. My backyard just isn't that large. Should I try to buy one of the many transceivers I see advertised. At least this would solve the problem of the transmitter and receiver?"

O.T.: "If you are loaded with cash, and can settle on one that also has cw capability, rather than just a concession to code operation in the form of a key jack, this could be a satisfactory solution. All the units are expensive though; they are all designed primarily for single-sideband 'phone operation (s.s.b.); and some are not suitable for c.w. operation and would therefore be of no use to you as a Novice. Don't forget, too, that as a Novice you must transmit with crystal control, and most of the transceivers are v.f.o. operated for both receive and transmit. How much are you able to spend, David?"

David: "I've saved about $100 and I plan to use this for a receiver. Dad is going to help me by laying out up to another $100 for a transmitter. But how do I know what to look for?"

O.T.: "Let's take the receiver first. Modern communications receivers are complex affairs and they are expensive. There are few receivers selling new, in the neighborhood of $100, that I would consider usable for amateur radio work. However, the interesting thing about this is that with the multitude of new receivers introduced each year, hams are continually trading-in old models. Some of these *old* models may be no more than a few years old at most, and may still have many good years ahead. So maybe they need a new tube. They can be bought for a third to a half of the price they originally commanded, and immediately you're in the driver's seat of a piece of real equipment. Look for such buys at your local radio-parts distributor; in the flyers that some distributors publish; and of course, from your own friends and acquaintances. Be sure to listen to the receiver. Determine that it picks up signals all across each band, not just the ham bands. Check for noisy controls. Switches can be cleaned, but volume, and gain/sensitivity controls must be replaced. Check calibration; either with the internal crystal calibrator (if it has one), or against the signals from WWV, or a local source, such as a station v.f.o. If the receiver is badly out of calibration, it could be evidence that a complete re-alignment is required. But chances are that this will not be necessary, particularly in the case of two-dial, electrical bandspread, general coverage receivers. You should be able to get a good buy for your $100, if you take just a little time to look."

David: "Break! Break!"

O.T.: "Roger. Go ahead" (This boy is learning fast.)

David: "I know. You're going to tell me to look for a used transmitter too. Over."

O.T.: "Not exactly. If you happened to find a used, commercially wired 400-500 watt rig for $100, buy it. But chances are slim. Rigs of this capability seldom hang around long without an owner, and they bring much higher prices. On the other hand, I am not going to suggest that for your first rig you first obtain a blank chassis and then start mounting parts. Remember, our initial goal is to get you on the air to obtain some real experience by means of communicating. At this point you have something less than a year left, and while this is more than enough time if you go about it properly, if you waste endless weeks and months debugging your own homebrew transmitter, your license could expire before you have an opportunity to use it."

David: "Break! Break!"

O.T.: (not again?)

David: "I know. You're going to suggest that I borrow a transmitter from a friend."

O.T.: "Not exactly. Part of being a ham, and in addition to being at ease with c.w., is the necessity to have some familiarity with the operation of your transmitter. Some knowledge of the devices connected to the opposite end of the dial shafts. While it will take some time for you to learn how each part functions and of its contribution to the circuit, you can at least begin by learning what these devices look like, and how they are connected. I suggest a kit. From the beginning, you will have a feeling of being involved, and the thrill of those first contacts with a rig you built yourself will be treasured forever. It makes not the slightest difference that you didn't have to punch the chassis holes yourself. Building from scratch is fine. You should do lots of it in your ham career. But first you have to find out what it's all about. A kit is a fine way to begin, and if you follow instructions carefully, you won't be disappointed with the results. I recommend a rig in the 90-120 watt c.w. input level; one that can also be operated with reduced power of 75 watts while you are a Novice. The difference in the signal strength between this transmitter and the 400-500 watt rig mentioned earlier is just about one S unit. Very little to quibble about, but lots of difference in price, and you will have learned something."

David: "Break! Break!"

O.T.: (now what?) "Break-in station. Go ahead." (What am I saying. I thought we were on the telephone.)

David: ROGER OT BT GREAT CIRCUIT WE GOT HR BT CAN WRK FULL BREAK BT WAT ABT ANT FER 80 IMI K

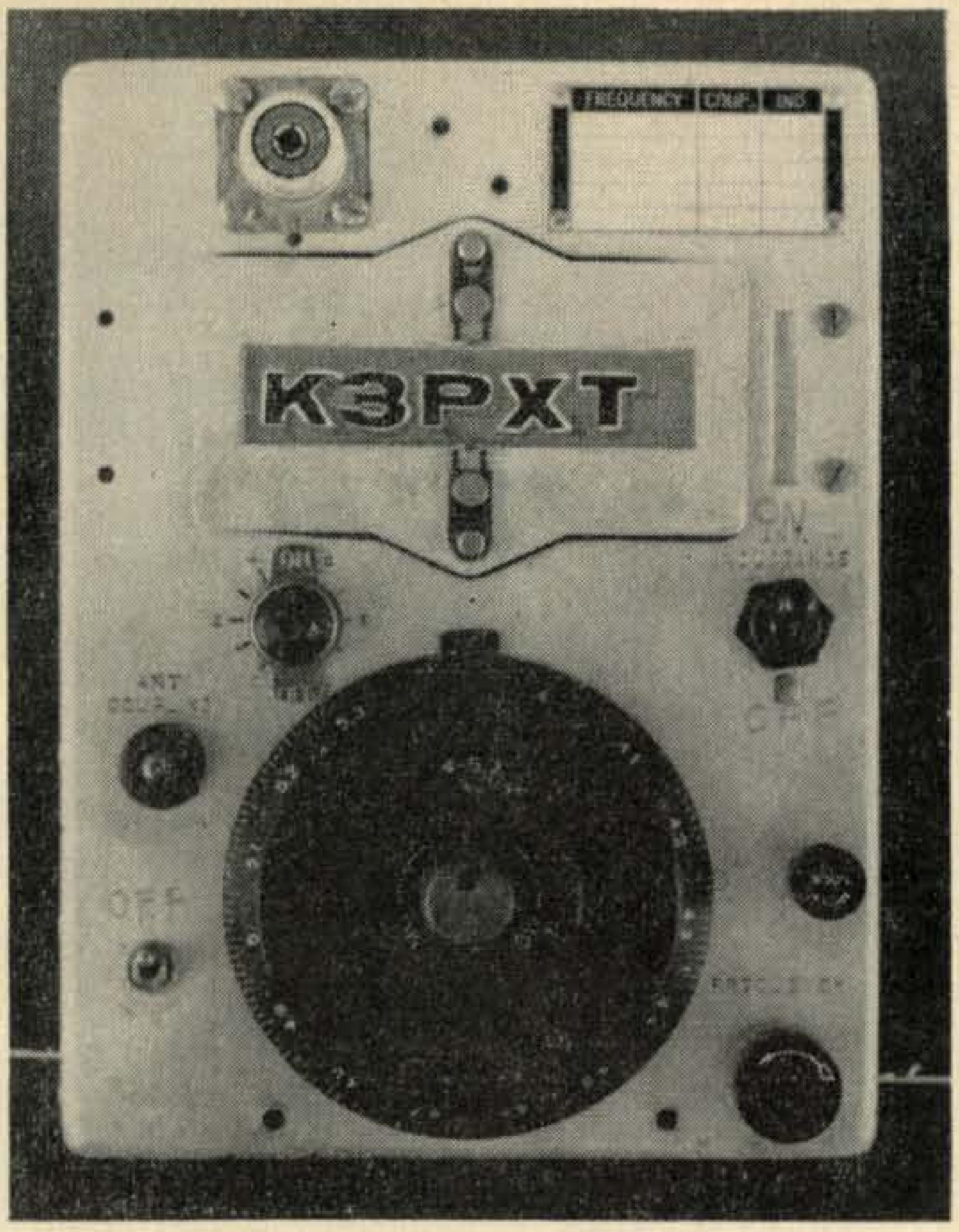
O.T.: (somebody must be coaching this boy.) WL SND U A — (What am I doing?) "David, I will send to you, by mail, a sketch of the antenna I recommend."

David: TNX VY MCH OT BT HPE C U ON LOW END 80 SN BT GUD DX ES 73 SK

O.T.: GUD NITE DAVID. (Young people sure learn fast these days.) □

Keep studying for your General

Front view of the modified ARC-5 v.f.o.



A SIMPLE ARC-5 V.F.O. CONVERSION

BY CARMEN J. DIODATI,* K3PXT

Here is a simple ARC-5 v.f.o. conversion for use on the high bands, 6 and 2. TVI is eliminated by reduced power output and proper shielding.

Many 6 and 2 meter stations are using a modified ARC-5 as a v.f.o. Impressed by the low cost of these units and the apparent good results obtained by the using stations, it was decided to obtain and modify one for the home QTH; accordingly, information was requested from each station contacted which used the modified ARC-5 v.f.o.

From the information obtained it was concluded that results were generally satisfactory; however, the prevalent complaint was TVI and frequent replacement of the input tube of the transmitter. It was further determined that the majority of stations using the ARC-5 had not done the modification, but had obtained them as a result of a swap or purchase.

Additional investigation revealed that the TVI generators had little or no modification, were being operated with the top and/or bottom cover removed, used unshielded wire to the transmitter input, and above all, used power supplies which delivered voltages in excess of the design requirements. Any one or a combination of the above, will cause objectionable TVI. However, the TVI grows to unreasonable proportions when the ARC-5, not properly modified, is used as a v.f.o.

The reason for the increase in TVI is that most oscillator circuits of transmitters are designed so that the crystal will drive the oscillator stage between two and three times the cut-off value of the tube. The improperly modified ARC-5 v.f.o. drives the oscillator stage a good bit further than this. The further the oscillator is driven into the cut-off region, the richer the harmonic output. The result—bigger and better TVI through more channels of the idiots' delight. In general, many of the ARC-5 v.f.o.'s presently in use, put more power into the crystal socket than the transmitter is capable of putting into the antenna. Consequently, the proud (?) owner of the improperly modified ARC-5 are confined to watching the boob tube, when he would prefer to operate; or the unit is placed in a corner waiting for a good swap or sale.

With proper modification; the ARC-5 as a v.f.o. will compete with any commercial unit. As for cost, there is no comparison—you'll be dollars ahead. Many ARC-5's have been on sale at Hamfests for as low as one dollar. In one instance new ones in sealed cartons went begging for the low price of three dollars. Add approximately five dollars for additional parts; and you will realize the exceptional economy. More important is the fact that the stability obtained with this modification compares favorably with commercial units which cost many times what it will cost for a modified ARC-5.

The modification differs from most in that it is applicable to many of the popular models: the T-20/BC-457 and the T-22/BC-459. This is made possible by removing the original final coil and replacing it with one having a much lower *Q*. The replacement coil resonates with

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*932 North Hilltop Drive, Churchille, Pa.

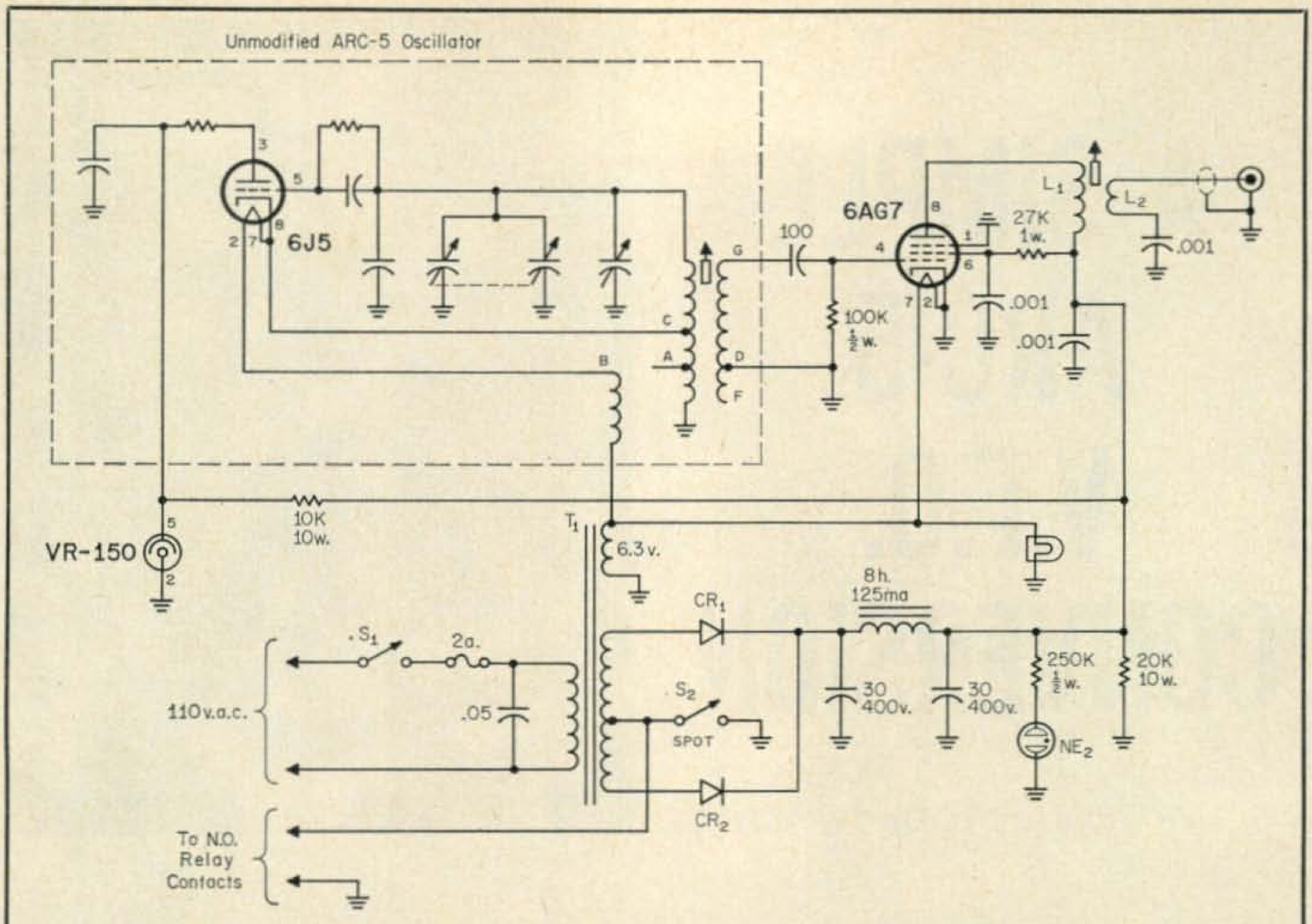


Fig. 1—Circuit of the modified ARC-5 v.f.o. The area within the dotted lines is the unmodified oscillator of the ARC-5. The output tube may be any of the other types mentioned in the text. All capacitors are rated in mf, except the 100 coupling capacitor which is 100 mmf.

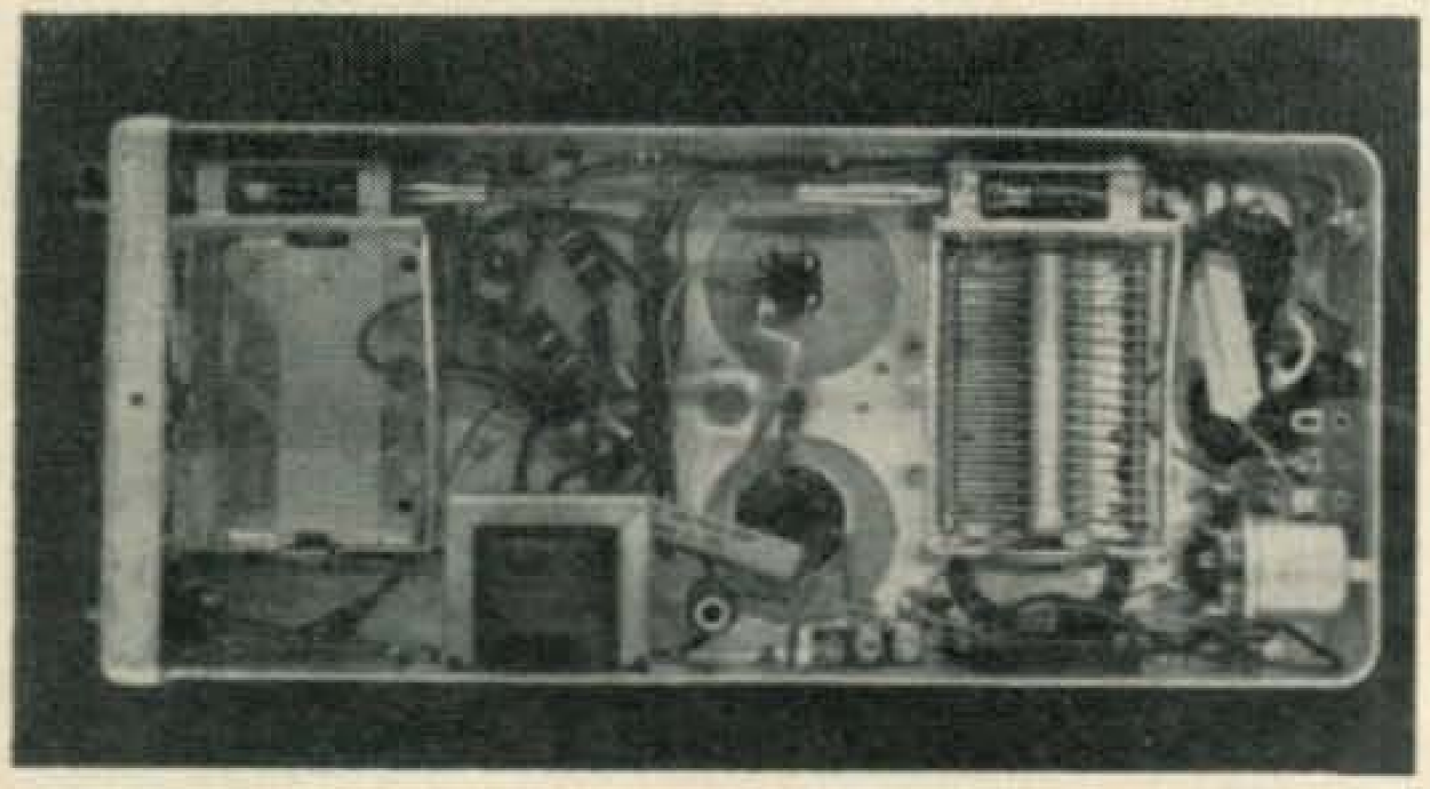
CR_1-CR_2—150 ma, 600 p.i.v. minimum ratings.
L_1—25t #28E. on a Millen form #69046 or equiv.
L_2—5t #28E. wound on the cold end of L_1.
T_1—400 v.c.t. at 90 to 125 ma., 6.3 v at 3 amps.

the circuit capacity for a broadband circuit with a constant drive throughout the range of the v.f.o. This eliminates the need for peaking when changing frequency.

The revised circuit doubles in the T-20 and BC-457 (4-5.3 mc) and is straight through in the T-22 and BC-459 models (7-9.1 mc). The output is sufficient to drive any transmitter without generating TVI. Moreover, the simplicity of the modification and the time required to complete the change makes it a reasonably simple project for the beginner, yet challenging enough for the expert.

Procedure

The following is a step by step method of preparation for wiring. The wiring instructions will not be given as the circuit, shown in fig. 1, is simple enough that the schematic diagram should suffice. The circuit is designed around the concept which utilizes parts on hand. Just about any tube can be substituted for the output. Some which have been used successfully are the 6AG7, 6CL6 and the 5763. In brief the only critical component is the coil, L_1.



Bottom view of the ARC-5 v.f.o. after modification.

Note: It is recommended that the following be read at least once before starting the modification in order to locate the component parts mentioned. When the word *snip* is used it should be defined as cutting the wires as close as possible to the connection point. When the word *remove* is used, it means to remove the holding screws of the part mentioned.

1. Wind L_1 and L_2.
2. With the top and bottom cover removed and the front panel facing you; remove the crystal, the 1629, and the 1625's.
3. Remove the 1629 socket and mount the filter capacitor in its place.
4. Snip the wires from the two feedthroughs, the wire from the plate coil to the output coil and the wires to the relay at the rear of the front panel.
5. Remove the plate coil and r.f. choke.
6. Remove the output coil and relay from the rear of the front panel, the antenna connector and ground lug close to the antenna.

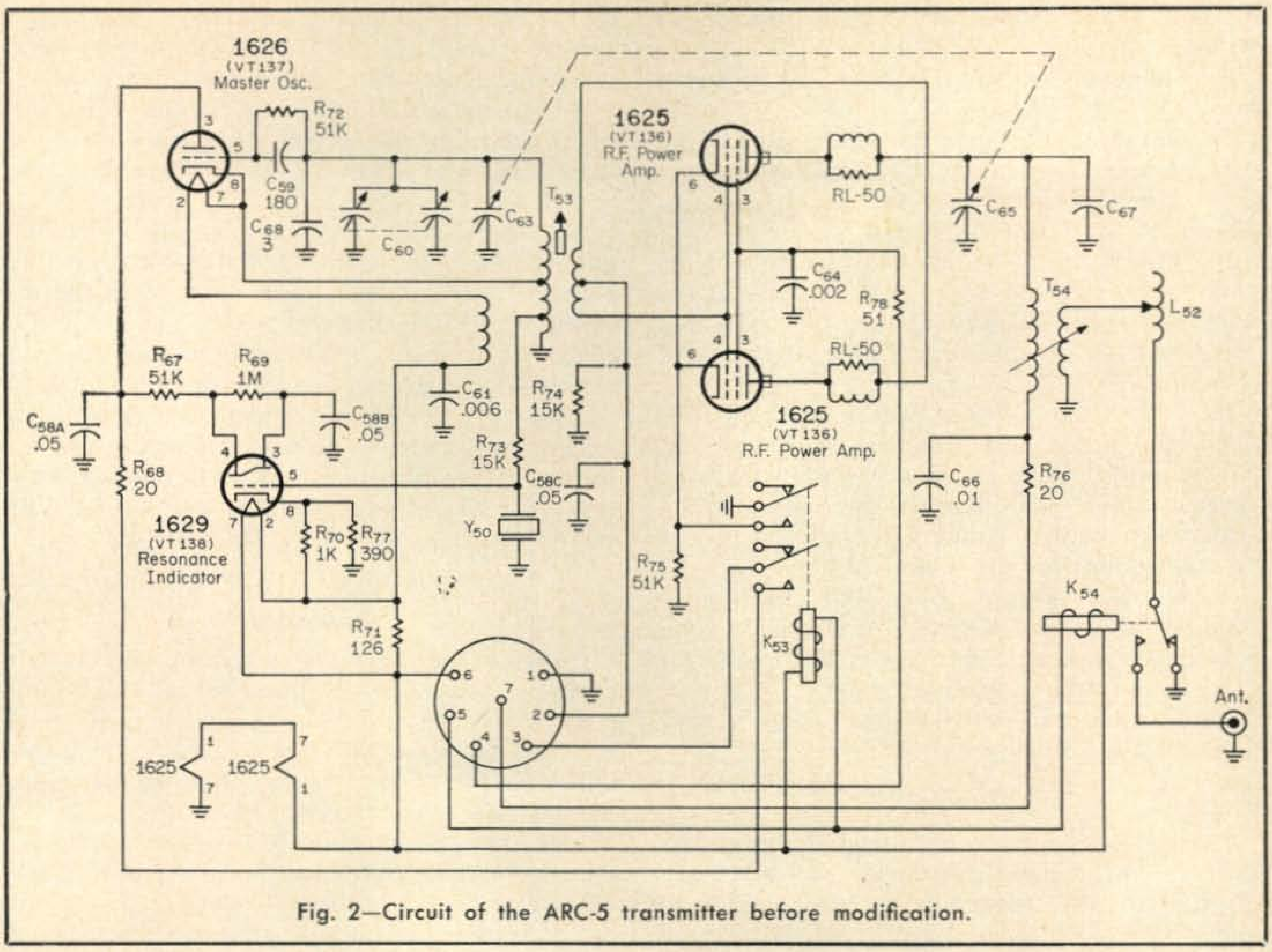

1626
(VT137)
Master Osc.
R72
51K
C59
180
C68
3
C60
C63
T53
1625
(VT136)
R.F. Power
Amp.
RL-50
C65
C67
C64
.002
R78
51
RL-50
1625
(VT136)
R.F. Power Amp.
T54
L52
R67
51K
R69
1M
C58A
.05
C58B
.05
C61
.006
R74
15K
R73
15K
R68
20
1629
(VT138)
Resonance
Indicator
R70
1K
R77
390
C58C
.05
Y50
C66
.01
R76
20
R75
51K
K53
K54
R71
126
Ant.
1625
1625

Fig. 2—Circuit of the ARC-5 transmitter before modification.

7. Remove the four screws on either side of the feed throughs; this releases a variable capacitor which must be removed later.

8. With a screwdriver, pry the aluminum tube socket edging from the 1625's; this releases the socket for removal.

9. With the unit bottom side up and front still facing you, snip the wires from the loosened sockets and remove the sockets.

10. Remove the relay from the right side panel and snip the wires.

11. Snip the wires from the variable capacitor, the center variable capacitor, the feed through on the right; and lift out the center variable capacitor.

12. Remove the plates of the front variable capacitor. (Use pliers and bend plates back and forth) then remove the shaft and the gear connected to this shaft. *Do not remove the capacitor frame.*

13. Remove the power resistor and the power socket from the rear then snip all wires with loose ends.

14. Cut a piece of aluminum sheet 2″ × 4″ and another 2″ × 2″. Drill a 5/32 hole at each corner of the plate.

15. Drill a suitable size hole for a power cord on the smaller plate and mount it over the power socket on the rear panel.

16. Mount a miniature phone jack on the rear panel 1″ from the bottom and ¾″ from the right side. (I used this for my auxilliary relay contacts; you may use any other jack or connector for this purpose).

17. On the larger plate drill a ¼″ hole 1″ from the top and 1″ from the side. Mount the coil (L_1) on the right side of the plate so that the adjusting screw is on the top side.

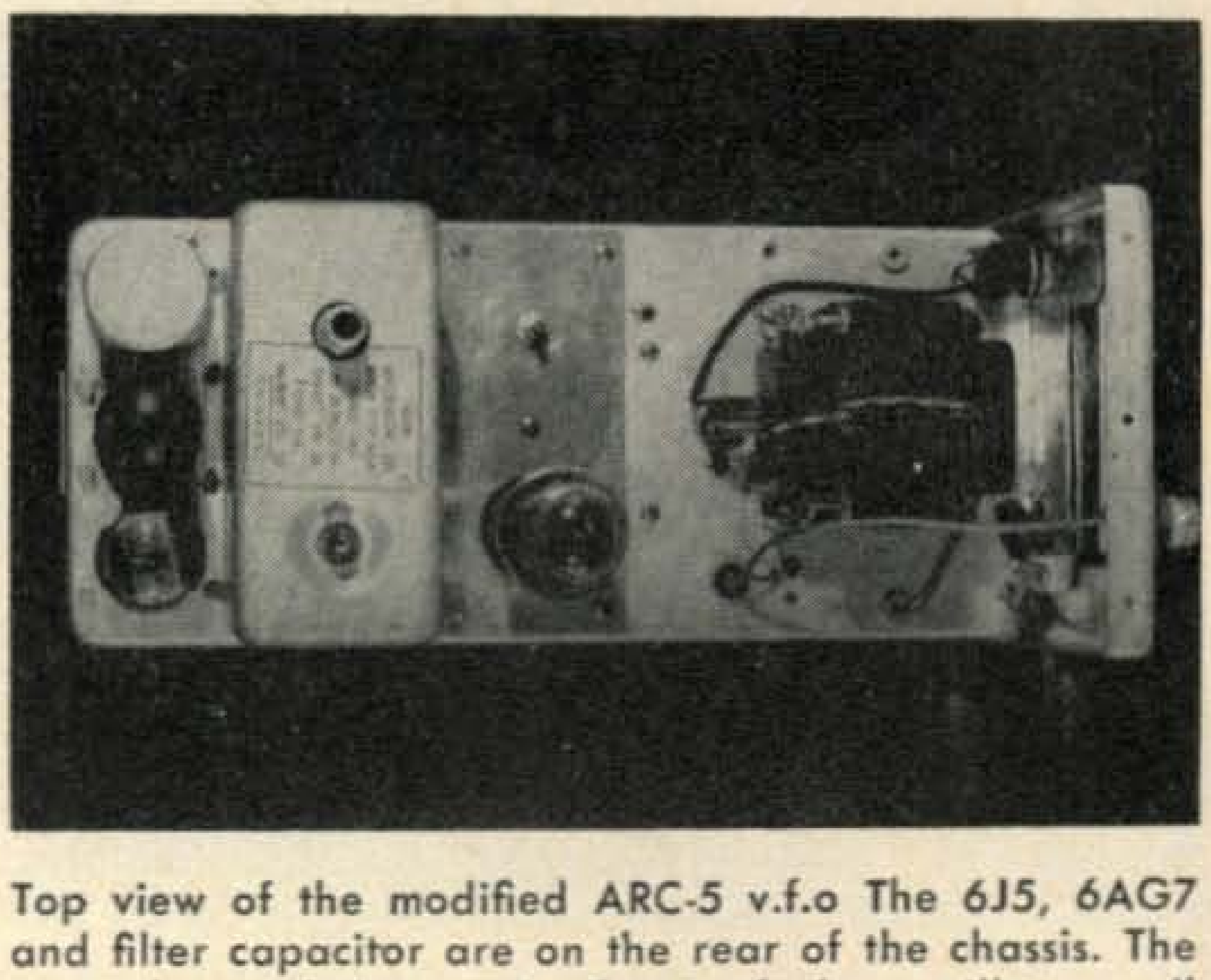
18. On the left side of the plate expand the hole for a tube socket using a Greenlee punch and mount this plate over the holes of the 1629 sockets.

19. Mount terminal strips and ground lugs as required.

20. Replace the 1626 tube with a 6J5.

21. Insert a u.h.f. connector in the original antenna hole after filing down the key:

22. Remove the ANT INDUCTANCE shaft and



Top view of the modified ARC-5 v.f.o The 6J5, 6AG7 and filter capacitor are on the rear of the chassis. The v.r. tube and L_1 are in front of the oscillator coil compartment.

mount a s.p.s.t. switch, this will be the power OFF-ON switch.

23. Remove the 0 to 10 shaft and mount a power OFF-ON indicator.

24. Remove the ANT COUPLING shaft and mount a neon light v.f.o. OFF-ON indicator.

25. Mount a s.p.s.t. switch to left of dial, this will be the v.f.o. OFF-ON switch.

26. Mount the power transformer behind the front panel, clearing all protruding parts of the front panel and obeserving that the bolts and transformer wires clear the frame of the front capacitor.

27. Mount the filter choke on the left side panel, and a six point terminal strip at a convenient point. Wire all power supply leads to these terminals, and complete the wiring in accordance to the wiring diagram; observing proper pin connections for the tube used.

28. Replace bottom cover and construct a cable of the desired length, using RG-58U and terminated with the necessary connectors for v.f.o. output and transmitter input.

29. Construct a dummy load using a #47 bulb and a u.h.f. connector.

Tuning

Tuning can be done with a grid dip meter; however, an all band calibrated receiver is preferred. Turn the frequency dial of the v.f.o. to align 4 or 8 with the dial index. Set the AC OFF-ON switch to ON and allow about a half hour for unit to warm up and stabilize.

With the receiver also stabilized, tune to obtain a zero beat (with S_2 on) and observe the frequency indicated by the receiver. If it is not at 4 or 8 mc, set the receiver to the desired frequency and adjust the right hand screw on the top of the sealed unit (front facing you) until zero beat is obtained. Connect the dummy load, insert the output tube and allow a few minutes warm-up and install top cover. Set the v.f.o. OFF-ON switch to ON. If receiver was set at 4 mc, tune it to 8 mc and adjust L_1 for maximum on the S meter.

Set v.f.o. OFF-ON switch to OFF, disconnect the dummy load and connect the cable assembly between the v.f.o. and transmitter. With the receiver set for the desired v.h.f. band tune to the center of the band or range of frequencies you choose to operate. Set the v.f.o. OFF-ON switch to ON and turn the v.f.o. frequency control for a maximum S meter indication and again tune L_1 for maximum S meter deflection. You are now ready for the type of operation which permits you to move up and down the band at will.

Operation

Connect the auxiliary v.f.o. OFF-ON switch contacts to a normally open set of relay contacts. With the v.f.o. OFF-ON switch in the OFF position, the v.f.o. will operate when the transmitter is turned on. For zero beating, the v.f.o. OFF-ON switch is set to ON. Otherwise, the switch is set to the OFF position to avoid heterodyning the receiver. A chart can be prepared for the v.f.o. dial versus receiver frequency. However, the preferred method is to zero beat the desired frequency as indicated by the receiver dial. This calls for a well calibrated receiver with a crystal calibrator. This smplifies the operation of the v.f.o. and more important you are assured of fairly accurate frequency results since the resolution of the receiver dial indication is generally better than that of the v.f.o.

Ham Operator Extraordinary

BY LOUISA B. SANDO,* W5RZJ

HERE is a YL who has used her ham station for so much public service work that it has become normal routine for her rather than the exception, and she often has been surprised to receive an award for "doin' what comes naturally." The YL is Beatrice Dietz, and her call is WA2GPT.

WA2GPT, Bea Dietz, holder of innumerable public service and BPL awards.

In the years since receiving her ham license—Novice in 1959 and General in 1960—Bea has handled an untold amount of traffic, helped find a missing Peace Corps girl in Honduras, located a truck driver in Pennsylvania to tell him he was needed at home, helped with the Alaskan earthquake, sent hundreds of messages to and from servicemen and women, and has secured rare-type blood and needed eyes. She has phone-patched and typed and sent code until her fingers tingled.

Bea has letters from the ARRL, Red Cross, U.S. Embassies, Peace Corps workers in Monrovia and Liberia, two Public Service Awards, a U.S. Navy Recruiting Service Certificate of Appreciation, Navy certificate for "Operation

[*Continued on page 100*]

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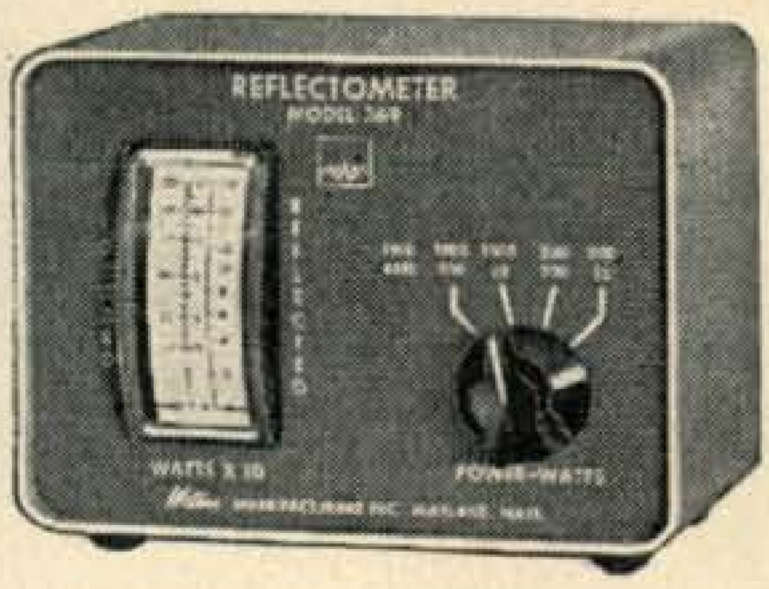

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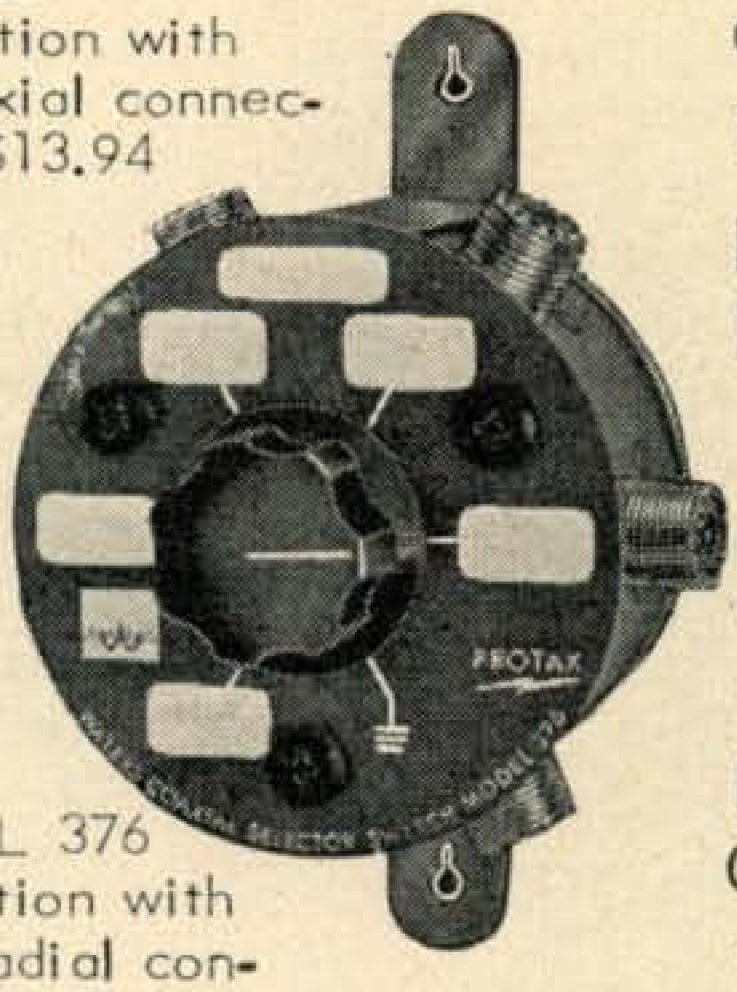

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NARROW BAND, THE NEXT STEP AFTER SIDEBAND?

By JOHN J. SCHULTZ, W2EEY/1

Part II

The author continues, in this concluding part of the article, to explain how narrow-band speech can be used to modulate a transmitter and some of the problems involved in using our present transmitters for this purpose. He also comments upon the future impact of narrow-band speech in amateur communications development.

IN THE first part of this article, it was shown how a speech processor "compressed" the frequency range of a voice signal. The "compressed" signal was then turned into a long digital code word or "frame." Figure 1 is an example of such a frame. Like a teleprinter signal, it consists of a group of on-off pulses but 30 bits long instead of only 7.

KY-585/U
PHILCO

The KY-585/U is a channelizer type of "Vocoder" or speech processor developed for airborne use. Other types of "Vocoders" have been developed which permit highly intelligible voice communciation over bandwidths smaller than 100 c.p.s. (photo courtesy of Philco Corp.)

As with a teleprinter signal, the narrow-band frame can be used theoretically to vary any characteristic of an r.f. signal-amplitude, frequency, phase or simply turn it on and off like c.w. keying. In the following paragraphs some of the problems involved in using these various forms of modulation are briefly discussed.

C.W. Keying

The digital frame could be used to simply turn an r.f. carrier on and off and produce bursts of r.f. carrier. The individual pulses should be made as short as possible in order to achieve the best ratio of peak to average transmitter power—as is done in a basic radar transmitter. Theoretically, 1,000 bits/second could be transmitted by on-off keying in a bandwidth of 1 kc. Therefore, we could have a transmitter with 100 watts average producing 10 kw peak power in a 1 kc bandwidth transmitting our narrow-band speech.

It doesn't work that way however, (unfortunately). Even those amateurs who engage in really high speed c.w. work, 40 w.p.m. or more, notice that signals keyed at such speeds start to broaden out. Because of the sharp rise and fall time of a pulse, harmonics are generated. The

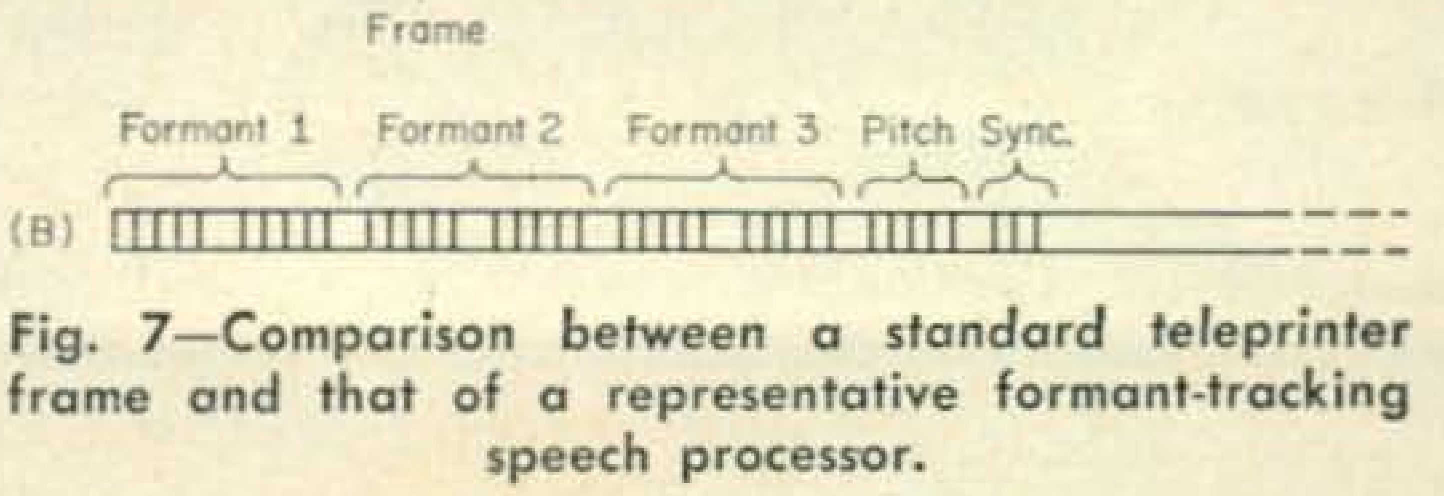

Fig. 7—Comparison between a standard teleprinter frame and that of a representative formant-tracking speech processor.

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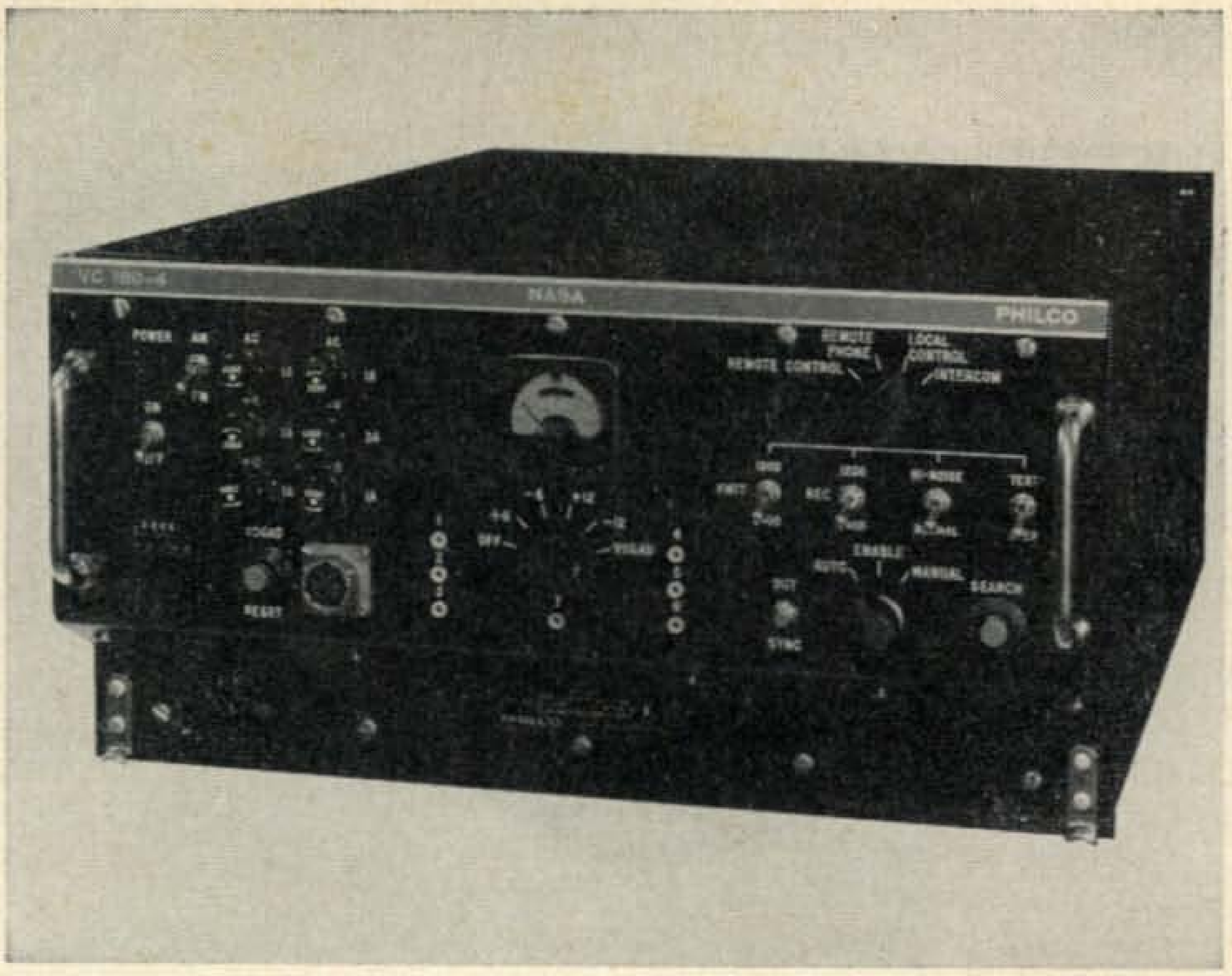
*40 Rossie Street, Mystic, Connecticut 06355.



The VC 180-4 is a transistorized analog output type "Vocoder" or speech processor which can transmit a voice channel in a 200 c.p.s. bandwidth. A 10-15 db improvement in the a.m. mode and 20 db improvement in the f.m. mode is claimed when used over a normal 3 kc bandwidth radio or wire circuit. (photo courtesy of Philco Corp.)

keying waveshape can be rounded and filtered to reduce the harmonic content. However, this cannot be carried too far because of the transient response of receiving equipment when receiving a signal which varies widely in amplitude, as short-wave signals do. The best compromise which seems possible is a bandwidth equal to 3 times the keying frequency.

Therefore, for the 1,000 bit/second narrow-band speech signal we would still need 3 kc bandwidth! When a phoneme speech processor is developed, as was described in the first part of this article, on-off keying of a transmitter may be practicable since the actual r.f. bandwidth needed will then only be about ½ kc.

The cathode or grid-block keying systems in our present transmitters might have to be modified but basically no other changes would be necessary to accommodate narrow-band speech by on-off keying.

Frequency-Shift Keying

The digital frame may be used to frequency modulate a transmitter in the same manner as present-day f.s.k. for teleprinter service. There would be no sense to using the present 850 cycle shift as this would hardly be conservative of frequency space.

A shift of 100 cycles or narrower would be suitable. If a sine wave keying waveshape at 1,000 bits/second were used at 100 cycles shift, the deviation ratio would be less than ½ and appreciable amplitude sidebands would extend out to at least twice the keying frequency or to 2 kc. Furthermore, as in the case of on-off keying of the carrier, a perfectly sinusodial keying wave is not desirable and when the wave is made more rectangular, the harmonic content of the waveform will act to broaden the signal beyond 2 kc.

F.s.k. also has the traditional disadvantage that the transmitter must constantly supply a carrier signal. This plus the keying-bandwidth problem make f.s.k. a poor means for narrow-band speech transmission by digital means.

A.M. Modulation

If a single tone were fed into an AM transmitter and keyed in accordance with a narrow-band speech digital frame, the normal sideband frequencies would result and the harmonics from the keying process would produce double the bandwidth situation as with on-off carrier keying. Therefore, this method would have no advantage whatever.

S.S.B. Modulation

If a single tone is fed into an s.s.b. transmitter and keyed with a narrow-band digital frame, exactly the same situation would result as with on-off carrier keying.

Other Modulation Systems

From the foregoing, it would appear that there is no way to transmit narrow-band speech over a conventional transmitter. Actually, the problem has been solved by a number of methods. The principle method used is to feed a series of tones into an s.s.b. transmitter. The digital frame is broken up into a number of parallel digital frames which then, by frequency-division multiplexing and using the slow-speed parallel frames to phase modulate the audio tones, provide the capability of handling a 1,000 bit/second digital frame in only 1 kc of bandwidth.

Such systems are *definitely* complex, on the receiving end as well since coherent detection is usually used by correlating the received signal with locally generated models of each of the signaling symbol combinations.

Perhaps the most important point, however, is that such techniques *have* been successfully used by a number of companies (Collins, Hughes, General Dynamics, etc.). They have built hardware which is designed to be fed directly to the voice input of an s.s.b. transmitter.

Stability

Although narrow-band speech information can be transmitted directly over any of our present s.s.b. transmitters, it is doubtful if it would work very well because of the stability of most of our present gear.

Anyone who has used a 800 or 1,000 cycle mechanical filter for RTTY realizes that it takes a very stable transmitter-receiver combination indeed if continuous tuning is to be avoided. The narrow i.f. filter would, of course, be necessary with narrow-band speech to avoid QRM.

The stability problem is not extreme, however, and is quite within present construction capabilities of even the careful home constructor. V.f.o.'s with a stability of 100 cycles per hour, for instance, should be suitable as a minimum.

Commercial and military equipment is making increasing use of synthesizer circuits for frequency control since they provide crystal-tability. If such circuits could be used to provide channels every ½ kc in the amateur bands, they might well be the most economical answer to ultra-stability for amateur equipment since stabilities of 1 part in 10^8 per day can be achieved.

Conclusions

The purpose of this article has not been to present any detailed description of the mechanics of narrow-band voice transmission but rather to acquaint amateurs with some of the techniques that are bound to have a profound effect upon future radio communications.

If amateurs are not successful at future international frequency conferences in retaining their share of spectrum space, and the outlook is not extremely bright considering that 80 and 40 meters in Europe are already only 200 and 100 kc wide, more emphasis will have to be given to using what frequencies we do have in a more effective manner. Simply packaging kw linear amplifiers into smaller cabinets so we can all more effectively QRM each other certainly is not the long range answer. Better operating habits, better frequency management of our available space and utilization of the latest technical advances, such as narrow-band speech transmission, *as soon as feasible* are the real answers. ■

References

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MODIFYING THE SWAN 350 FOR A.M. RECEPTION

BY WILLIAM BRASURE,* W2ZFE

In copying a.m. signals on the Swan 350 I found that the beat note and shift in some a.m. signals very annoying. In order to stop this I found that by cutting out the carrier oscillator tube, V_{14}, an a.m. signal could be copied very nicely. By doing this, however, the transmitter section is disabled. By connecting a relay and switch in the carrier oscillator tube, V_{14}, it could be turned on automatically while transmitting, and, the operator, by throwing a switch, could choose either a.m. or s.s.b. reception.

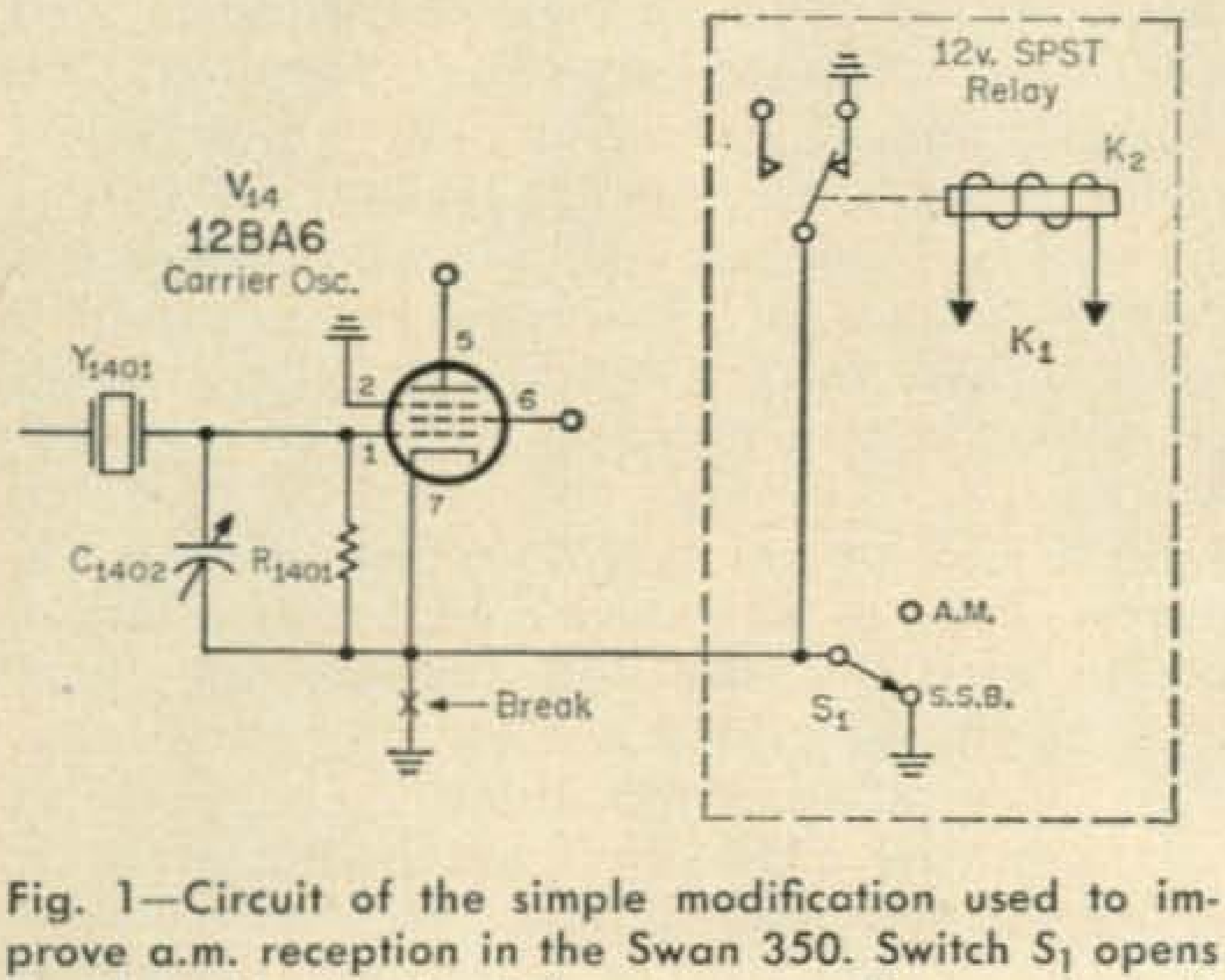

Fig. 1—Circuit of the simple modification used to improve a.m. reception in the Swan 350. Switch S_1 opens the V_{14} cathode circuit for a.m. reception or closes it for s.s.b. reception and relay K_2 automatically completes the cathode circuit for transmit operation.

In order to do this all you need is a small 12 volt s.p.s.t. relay and a s.p.s.t. toggle switch. In my case I have no crystal calibrator unit installed in the 350 and do not use the accessory plate on the back. I therefore mounted the relay using the holes in the chassis cut out for the crystal calibrator unit and drilled a hole in the accessory plate for the toggle switch. Anyone having a crystal calibrator unit installed or using the accessory plate on the back will have to use their own judgment in placing these parts as it is not critical.

Modification

The first step is to snip the ground wire on pin 7 of V_{14} (12BA6) off of ground lug. There will be a padder capacitor and resistor left on pin 7

[*Continued on page 99*]

*19 3rd Street, Gloversville, N. Y.

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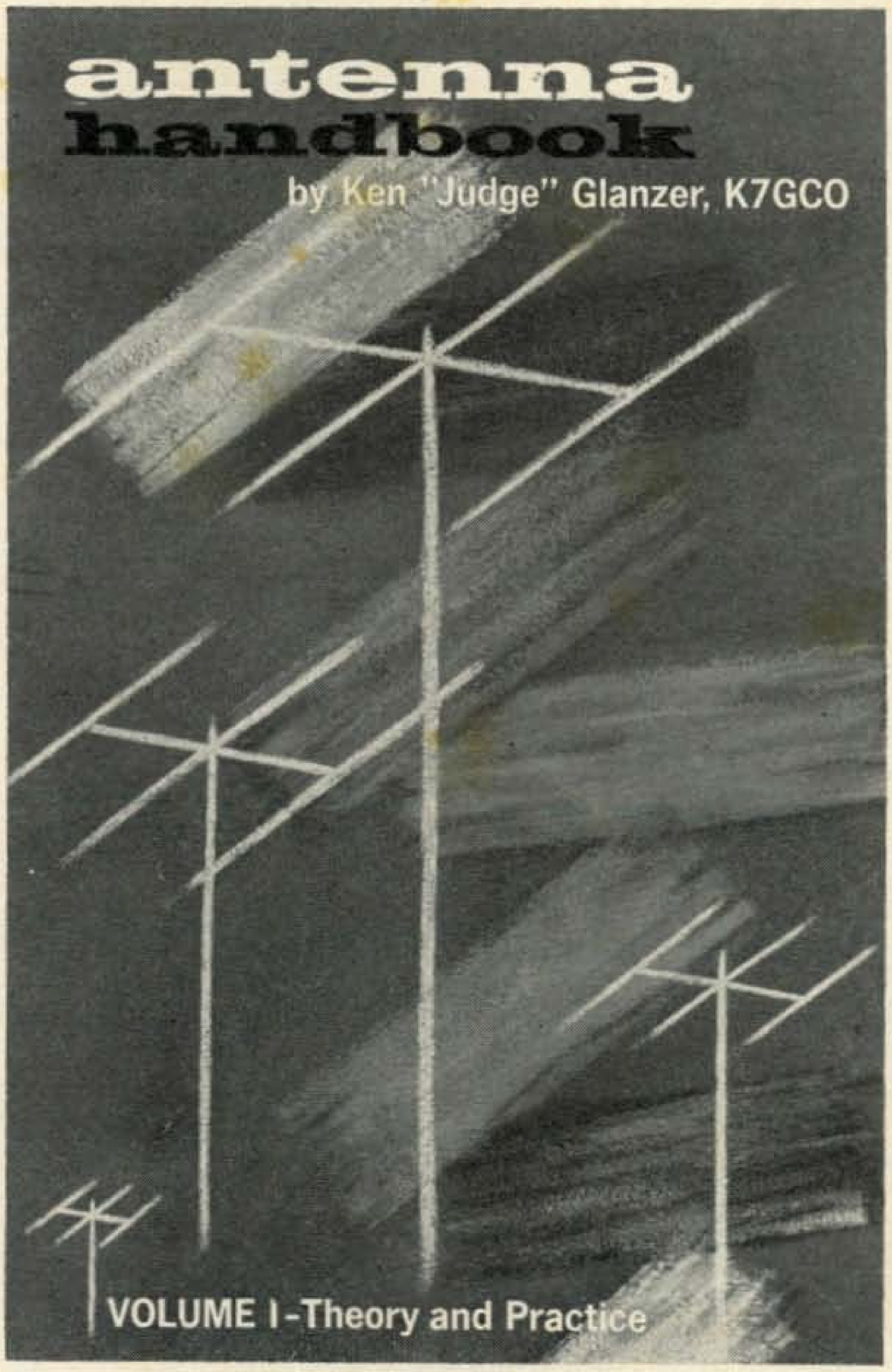

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HOW TO IMPROVE YOUR SB-34 TRANSCEIVER

BY ED MARRINER,* W6BLZ

Even an "Old Pro" is entitled to buy a piece of manufactured gear once in awhile, and searching the literature, the SB-34 seemed to best fit my requirements for mobile and the home station.

As soon as the transceiver arrived, friends said, "I wonder how long it will be before he starts to modify it." So far the soldering iron has not been used and many useful changes have been made without touching the rig itself. Thus the rule, that to modify manufactured gear lowers the resale value, has been observed. The statement must be qualified because the phono-type output jack was replaced in favor of the BNC coax fitting. Maybe the manufacturer really wanted this done, anyhow, because the hole in the chassis was already reamed out to fit the BNC chassis mount and the screw holes were there too. This slight change makes it much easier to remove the RG-58/U coax when moving the rig from the house to the car without having to pry the phono-plug off from the fitting with a screw driver. Mechanically the BNC is a much better arrangement and there is no chance for the braid to short to the center conductor when it is soldered. (See fig. 1.)

One other good idea which may not be necessary on all units, (it is a good idea to look) would be to cement two felt washers on the inside of the panel to keep the plastic dial from rubbing on the heads of the bezel mounting screws to prevent the scratching out of the calibrations. (See fig. 2.)

Linear Operation

For the home station one of the first things a SB-34 owner will probably want to do is hook on a linear amplifier (fig. 3). Assuming he has a grounded-grid amplifier everything is in good shape because the SB-34 puts out just about the right amount of power on all bands to drive most grounded-grid linears. It averages 68 watts across the bands and the output can be varied with the gain control, for proper drive.

Now, how about the fellow who has a Class AB-1 linear amplifier which only requires 10 watts of drive power? The solution for him is to use an r.f. attenuator. Ordinarily this is a problem because the attenuator has to be designed for a specific impedance output and usually requires large wattage odd value resistors. Using s.s.b. the power is injected into

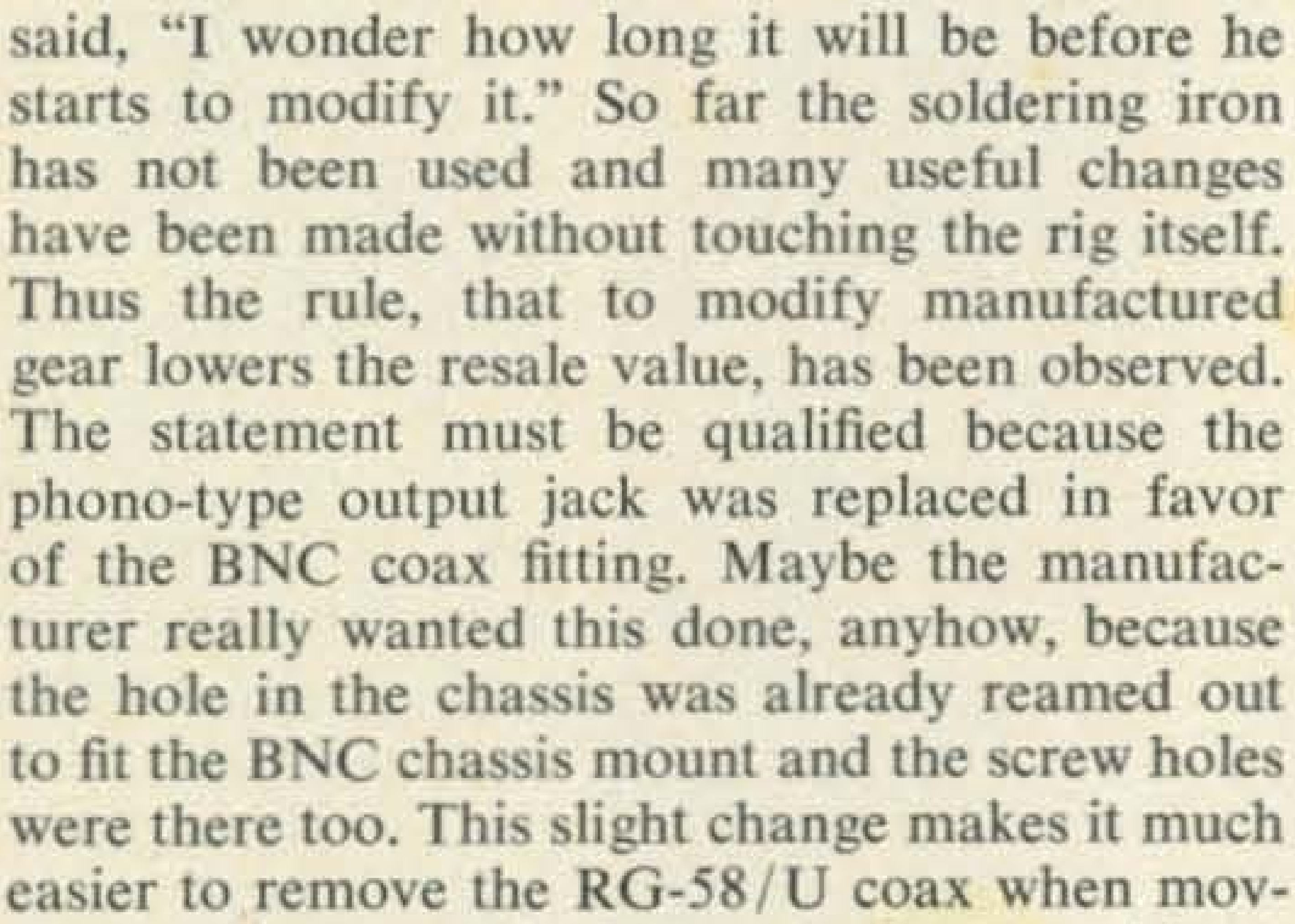


Fig. 1—View of the rear of the SB-34 showing the location of the BNC antenna fitting.

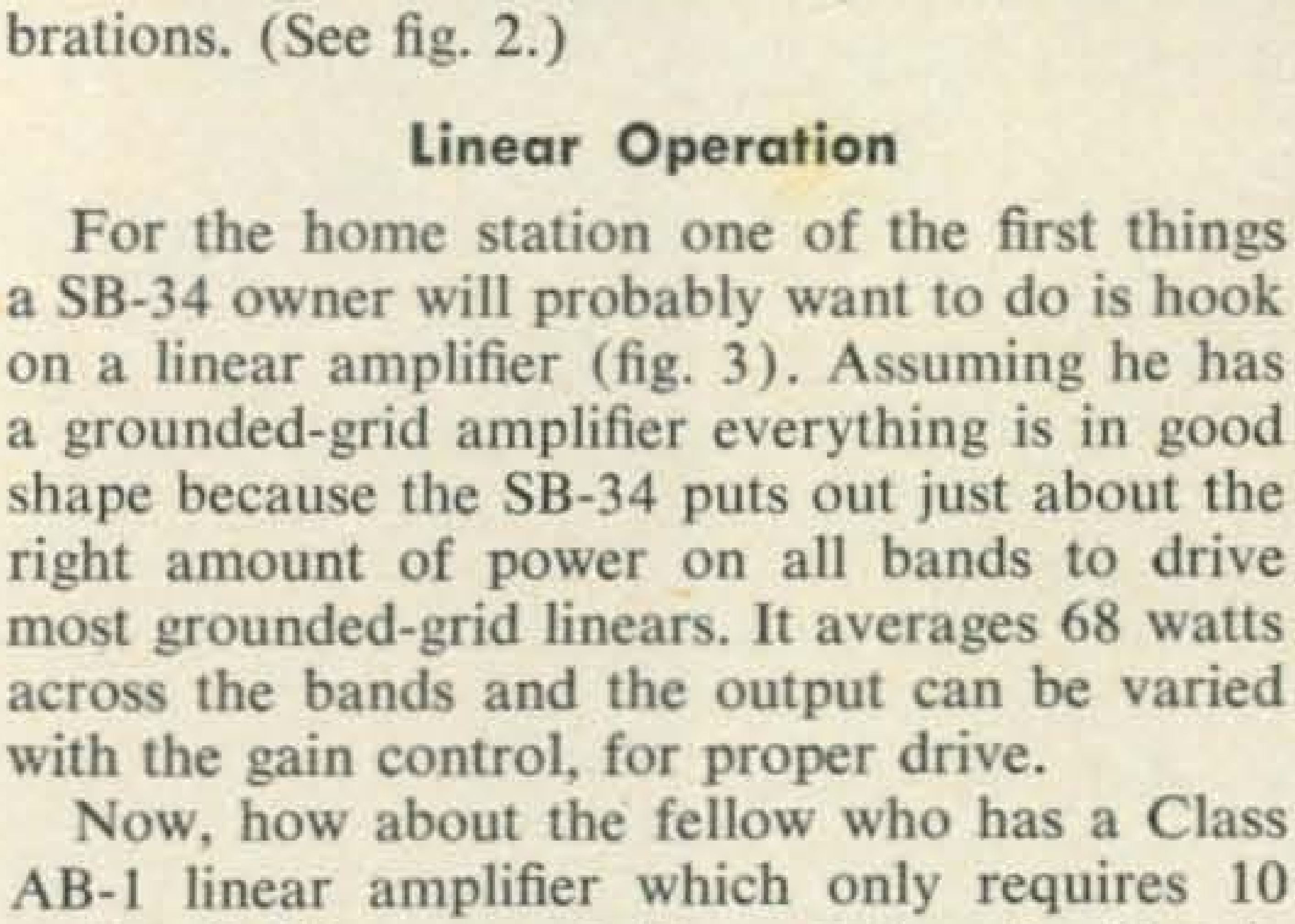
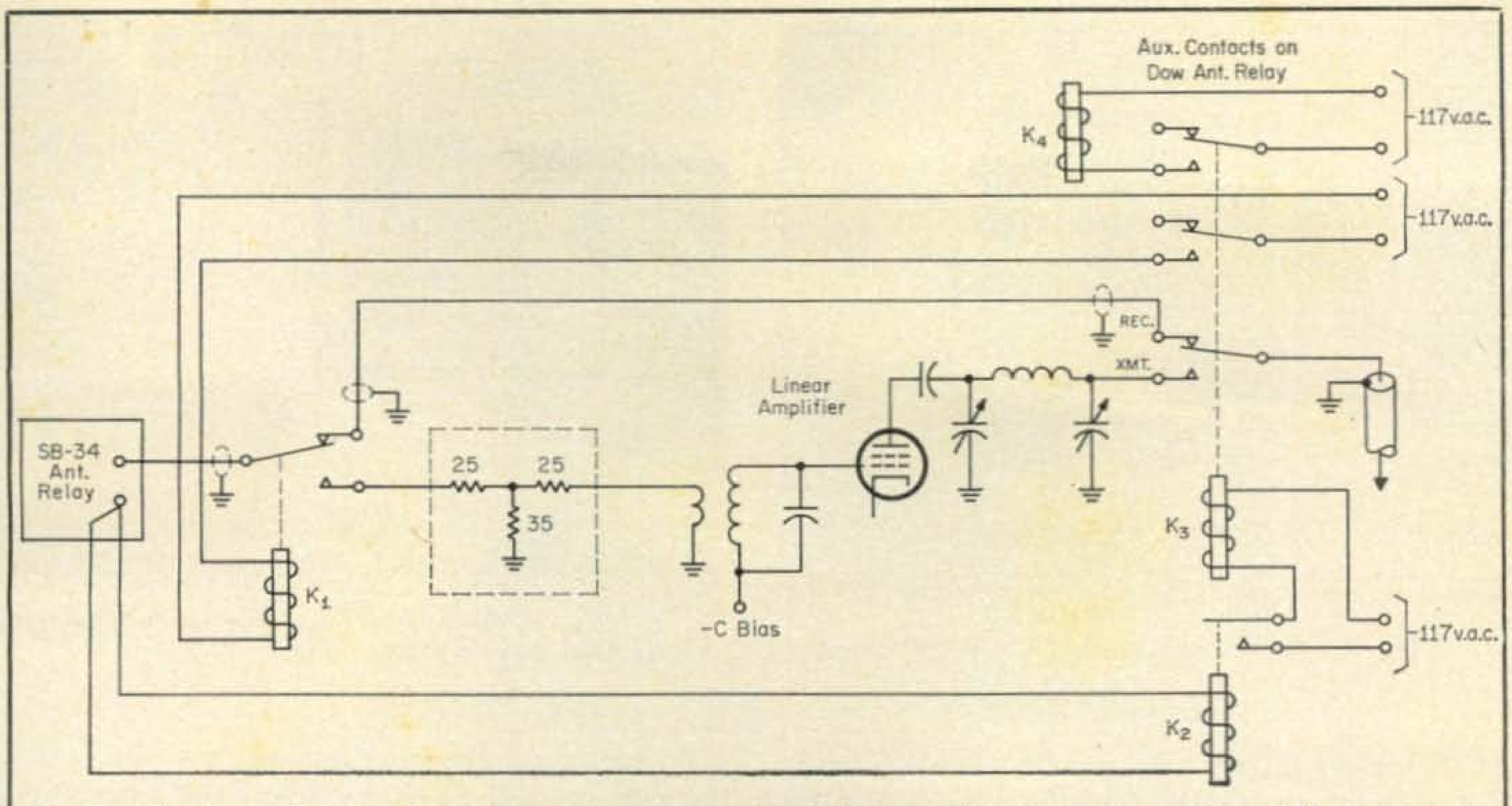


Fig. 2—View of the rear of the SB-34 front panel showing the two felt washers between the plastic dial and the panel.

---

*528 Colima Street, La Jolla, California.



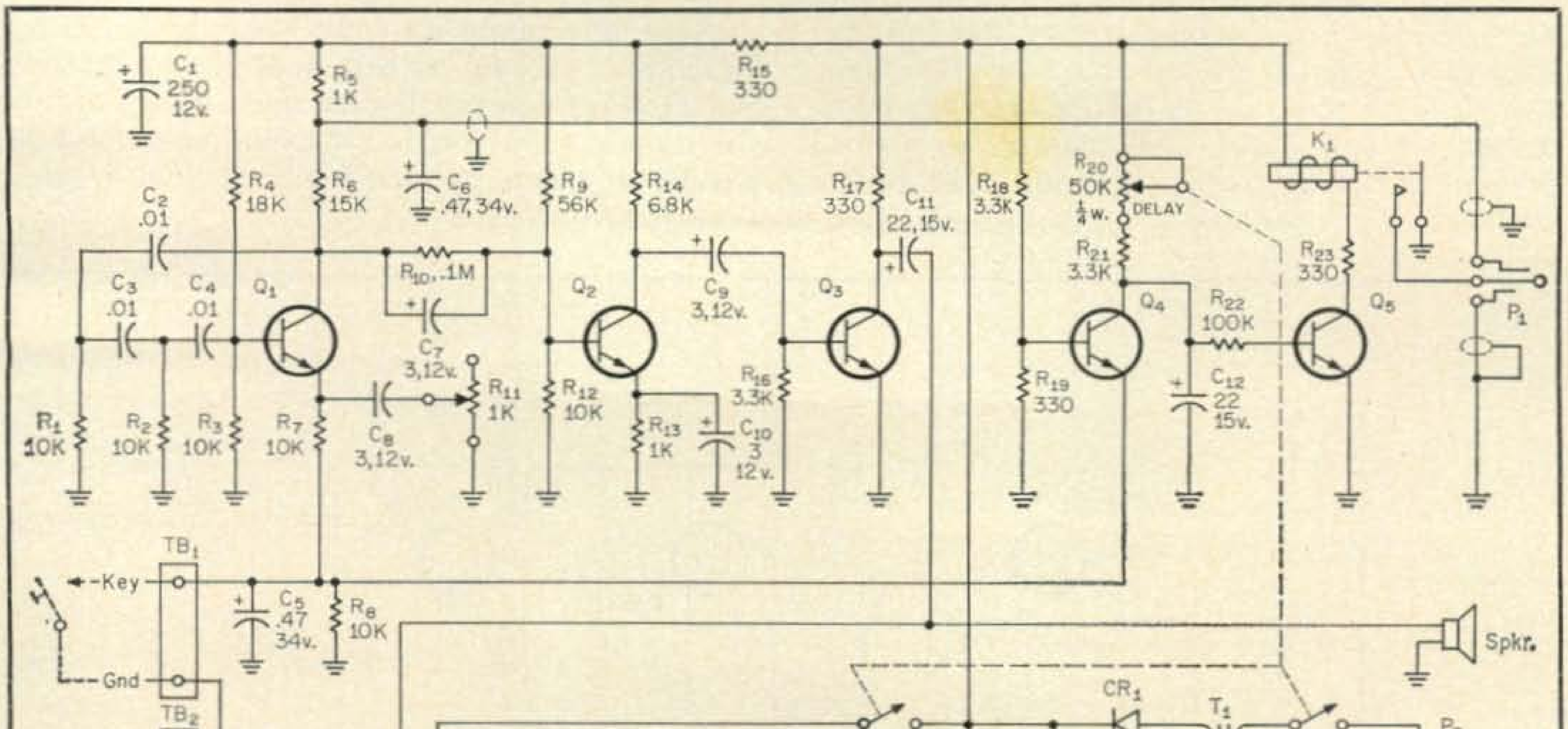
Aux. Contacts on Dow Ant. Relay
K₄
117v.a.c.
117v.a.c.
REC.
XMT.
Linear Amplifier
SB-34 Ant. Relay
25
25
35
K₁
-C Bias
K₃
117v.a.c.
K₂

Fig. 3—Circuit showing the interconnections between the SB-34, an r.f. attenuator, a Class AB1 linear and the required relays. The operation is discussed in the text.

the attenuator in pulses and therefore smaller wattage resistors can be used. The attenuator can be made from standard values of Koolohm type NIT-1 and which are available in even ohmic values. Since the SB-34 output will match any value between 40 to 100 ohms, the attenuator input does not necessarily have to be 50 ohms exactly, and since the output is matching a grid coil link on the linear, it is anybodys guess just what the impedance might be.

A rough attenuator using 25 watt resistors is shown in figs. 3 and 5. This reduces the SB-34 output to about 8 watts for driving a 4-400 Class AB-1 linear. In actual operation the resistors only get slightly warm and we can conclude the experiment is a success.

The complete hook-up for operating with a linear is shown in fig. 3. Twelve volts d.c. is obtained from the SB-34 to operate an auxilliary relay, K_2. Relay K_2 should have a 12 volt coil with a resistance of not less than 100 ohms. Relay K_2 energizes K_3, a Dow Key coaxial relay with two sets of auxilliary contacts. The coaxial contacts switch the antenna from the linear back



C₁ 250 12v.
R₅ 1K
R₁₅ 330
K₁
C₂ .01
R₄ 18K
R₆ 15K
C₆ .47, 34v.
R₉ 56K
R₁₄ 6.8K
R₁₇ 330
C₁₁ 22, 15v.
R₁₈ 3.3K
R₂₀ 50K ¼w. DELAY
R₂₁ 3.3K
R₂₃ 330
C₃ .01
C₄ .01
Q₁
R₁₀, 1M
C₇ 3, 12v.
Q₂
C₉ 3, 12v.
Q₃
Q₄
R₂₂ 100K
Q₅
P₁
R₁₁ 1K
R₁₂ 10K
R₁₆ 3.3K
R₁₉ 330
C₁₂ 22 15v.
R₁ 10K
R₂ 10K
R₃ 10K
R₇ 10K
C₈ 3, 12v.
R₁₃ 1K
C₁₀ 3 12v.
TB₁
Key
Gnd
C₅ .47 34v.
R₈ 10K
Spkr.
TB₂
Gnd
Tone
+12v.d.c.
CR₁
CR₂
T₁
P₂
(2) 1N2071

Fig. 4—Circuit of the Sideband Engineers Codapter for use with the SB-34 to permit c.w. operation. When the key is pressed the d.c. amplifiers Q_4 and Q_5 trip K_1 turning on the transmitter. The output of Q_1 is fed to the microphone audio contact to provide a tone and Q_2 and Q_3 drive the speaker, LS_1, for monitoring. The Q_4, Q_5 circuit is delayed to keep the transmitter on during keying; the delay is adjustable.

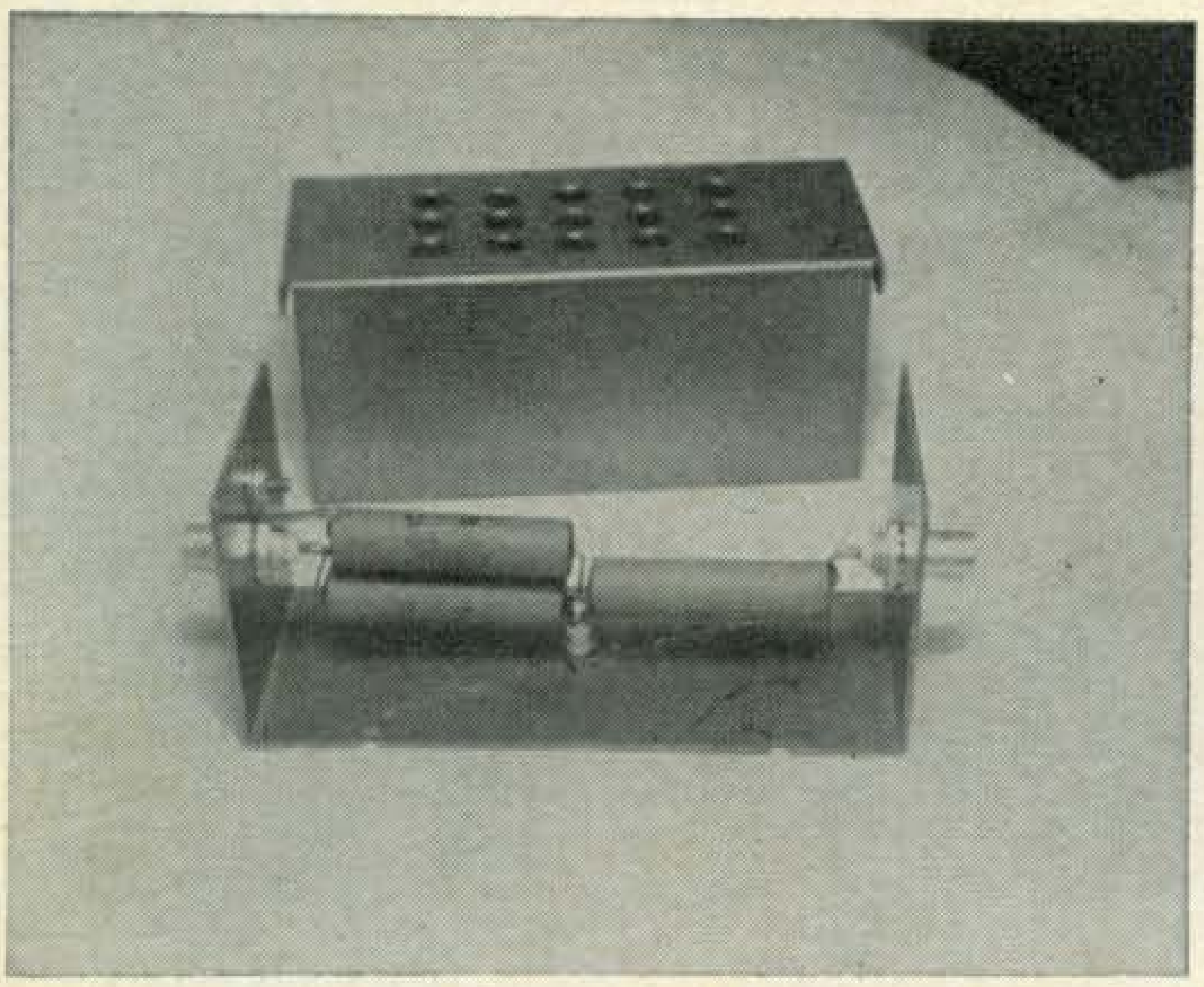


Fig. 5—Interior view of the r.f. attenuator.

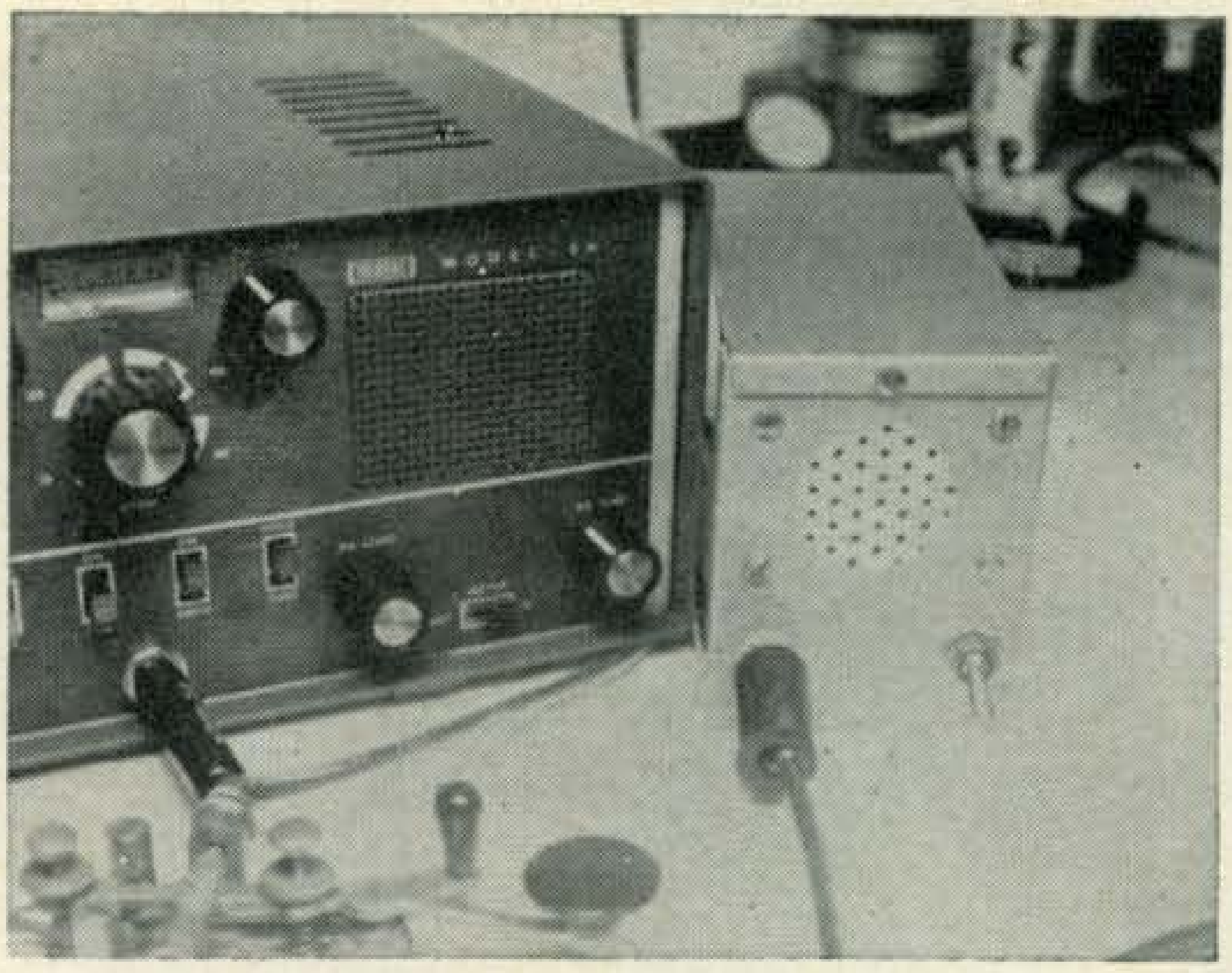


Fig. 7—View of the homebrewed keying unit built in an LMB box #EL534, L-5⅝", W-3", H-4".

to the SB-34 through K_1, another coaxial relay, but without auxilliary contacts. The second set of auxilliary contacts on K_3 are used to operate K_4. Relay K_4 controls the linear by applying plate voltage or removing a blocking bias on the final amplifier.

C.W. Operation

There is enough tuning overlap into the c.w. bands so that an SB-34 owner may want to give c.w. a try. The SBE company sells a Codapter SB-2 unit (fig. 4) to go with the SB-34, but if you used every last penny to buy the main unit and still want c.w. there are several ways to do it without buying an elaborate keyer. If you don't mind using a switch to change from RECEIVE to SEND, the unit shown in figs. 6, 7 and 8 can be used.

Several suggestions were printed in other publications showing how to key the low frequency r.f. signal around the filter. The only trouble with this idea is that a hole has to be drilled for a key jack, and there is no way to prevent clicks. The other solution is to feed a 1 kc tone into the microphone jack similar to the Codapter SB-2 sold by Side Band Engineers.

A simple phase shift oscillator can be made, but it *must* be free from any distortion. It also works better if it is fed into the microphone jack via a line transformer. Without the line transformer, using capacitive coupling, trouble was encountered with some carrier being on all of the time via the ground system. The transformer solves this problem very well. The transmit switch is a toggle switch grounding the microphone button. Transmitter output is controlled by feeding in the oscillator to the microphone jack and then adjusting the microphone gain control. Several tones were tried and 1100 to 1200 c.p.s. was the best. Anything lower than 1000 cycles seems to give a modulated tone.

Mobile Mount

Now, how about a mount for holding the rig in the car? (See fig. 9) SBE sells one for $12.50, but again, if you just had enough money to buy the rig what can you do? It would be difficult to exactly duplicate the one made by SBE because

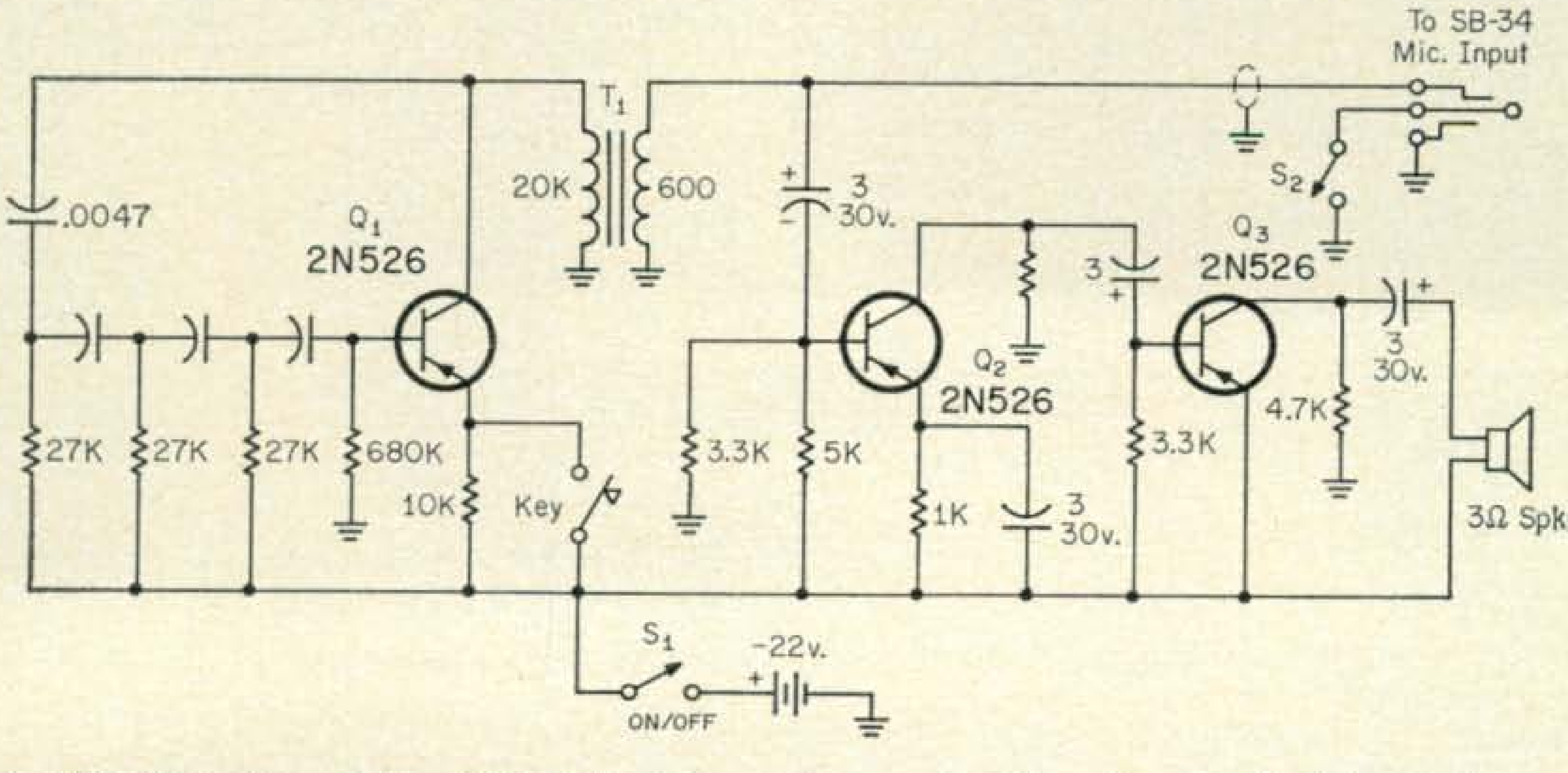


Fig. 6—A simplified version of the SBE Codapter can be made using the circuit shown above. This circuit, however, requires manual T/R operation with S_2. Transistors Q_2 and Q_3 constitute a monitor amplifier while Q_1 is a phase shift audio oscillator. All capacitors are Eric discs, type CK62472M. Transformer T_1 is a Stancor Ouncer series obtained surplus from J. J. Glass Co., Los Angeles, California.

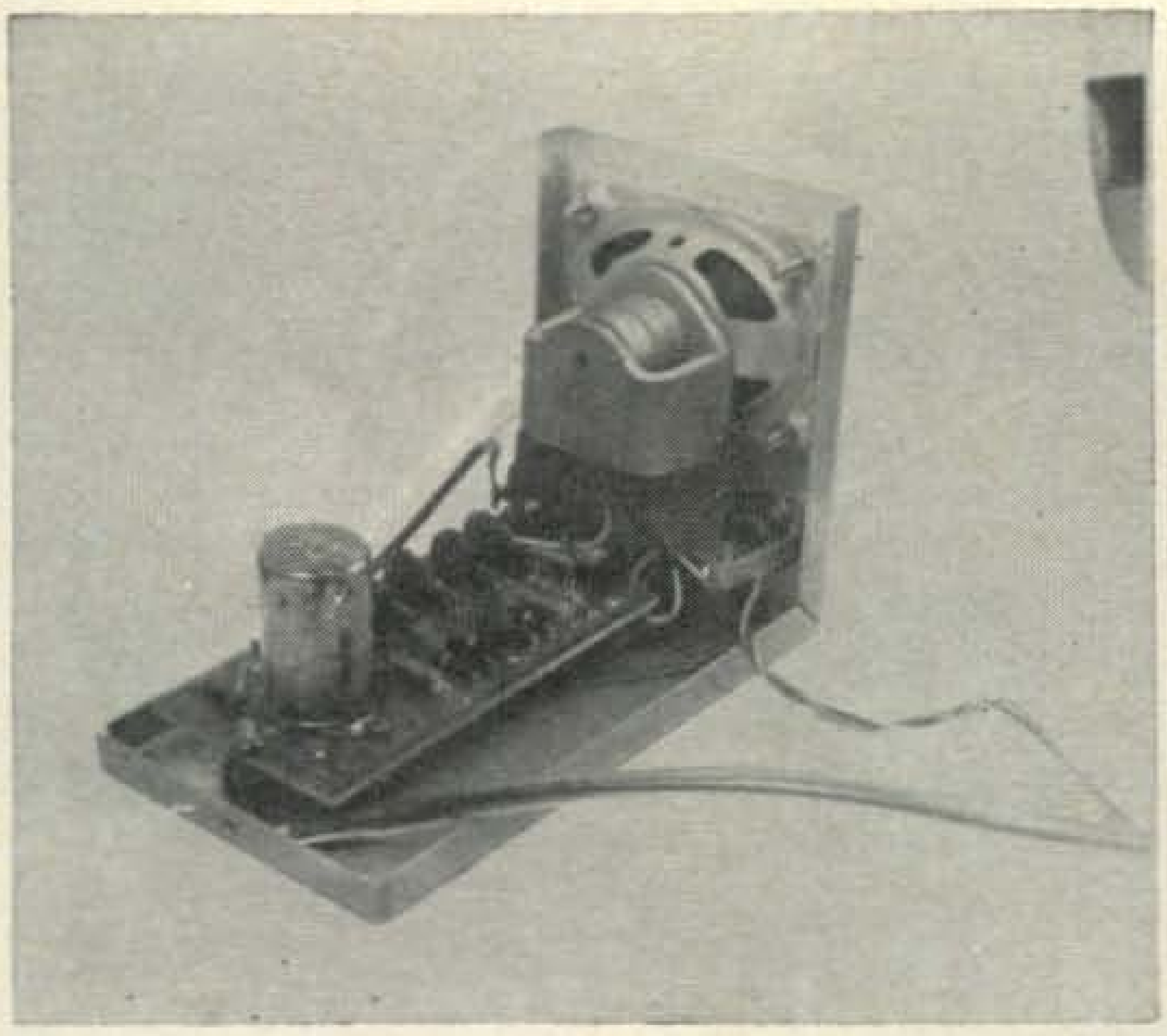


Fig. 8—Interior view of the keying unit showing the simple construction technique.

the metal warps if you try to put dimple in the pan to hold the feet. You can make a mount by bending a couple of ¾ inch lips on the sides of a piece of 16 gauge aluminum (or thicker). Then file two slots to fit a sliding piece of 1½″ metal. The idea of this sliding metal is that it will go through a bracket underneath the SB-34. Since the metal cannot be dimpled for feet, this bar will hold the SB-34 from sliding around, and can also be used for locking purposes by drilling a hole for a lock.

Other Modifications

One more radical change to the SB-34 would be to exchange the tube socket power plug for a Cannon Type Military plug, type AN 3102A-20-27P and plug #MS 3106A20-27S. This is a more difficult change, but will make it a lot easier to remove the power cable when switching from the home station to the car. The old plug can be pulled away from the chassis backward to where the wires are exposed and the new plug soldered in place. Just find a plug in the surplus store that will fit the large size hole; new ones are expensive. ■

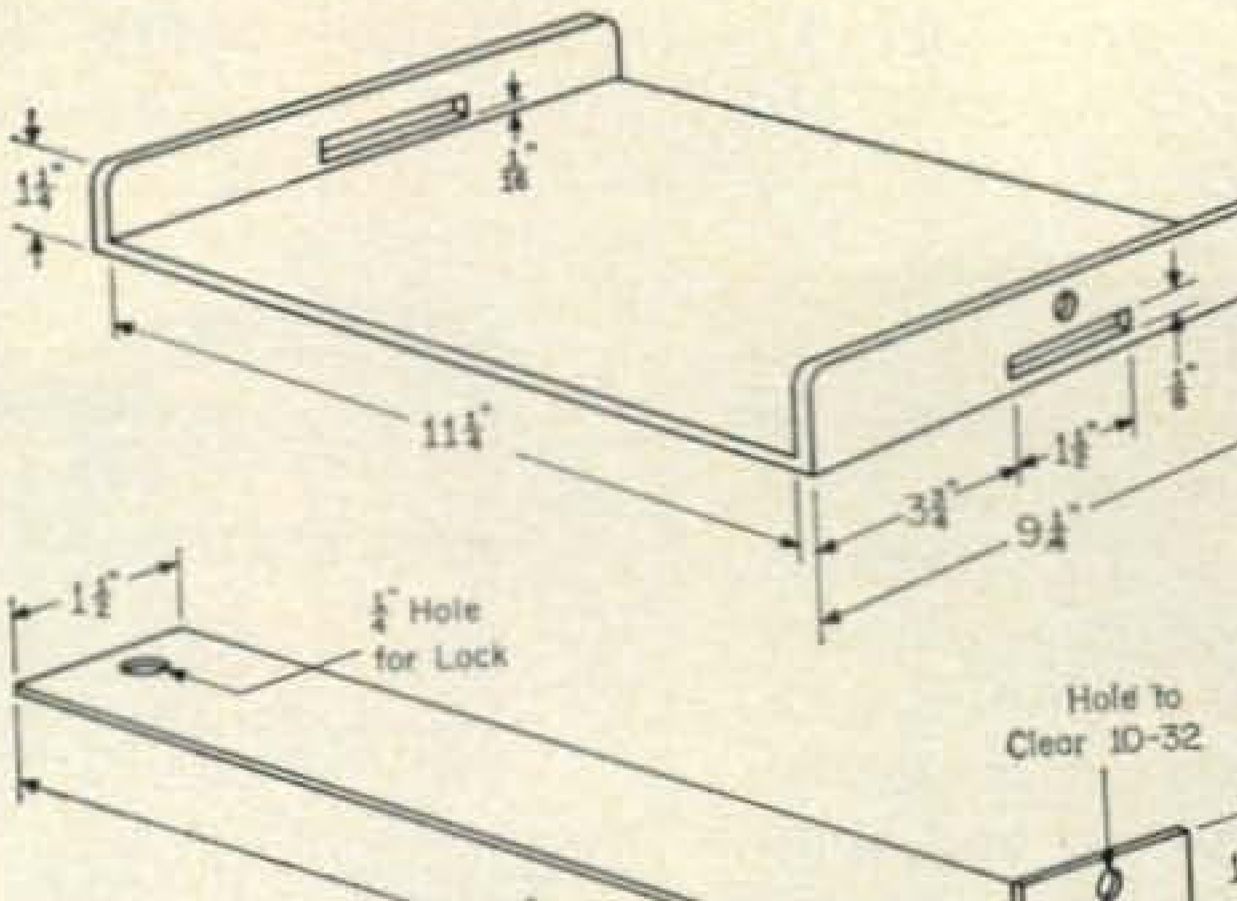


Fig. 9—Dimensions for the SB-34 automobile mount described in the text.

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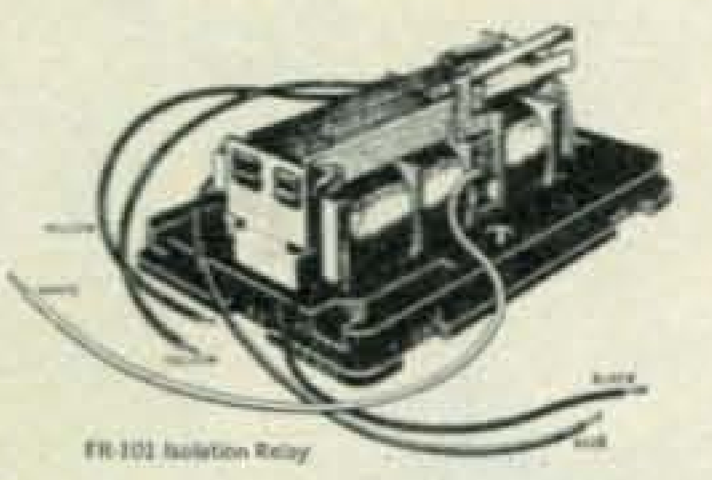
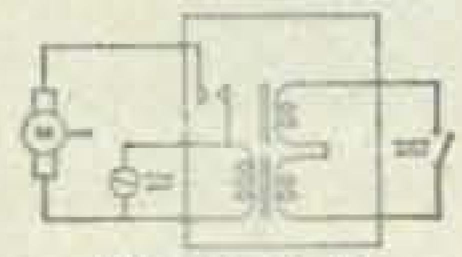


FR-101 Isolation Relay



Isolation Relay Schematic

A compact relay which has many uses in remote control applications demanding safe, isolated control circuits has been announced by Alcoswitch. It incorporates a transformer and a low voltage relay. It has low current drain and operates from 95 to 125 v.a.c. and is capable of handling a 5 amp load. The unit sells for $3.85. For complete details write to Alco, 3 Wolcott Ave., Lawrence, Mass., 01843 or circle 65 on page 110.

General Industrial

General Industrial
Slide Rule

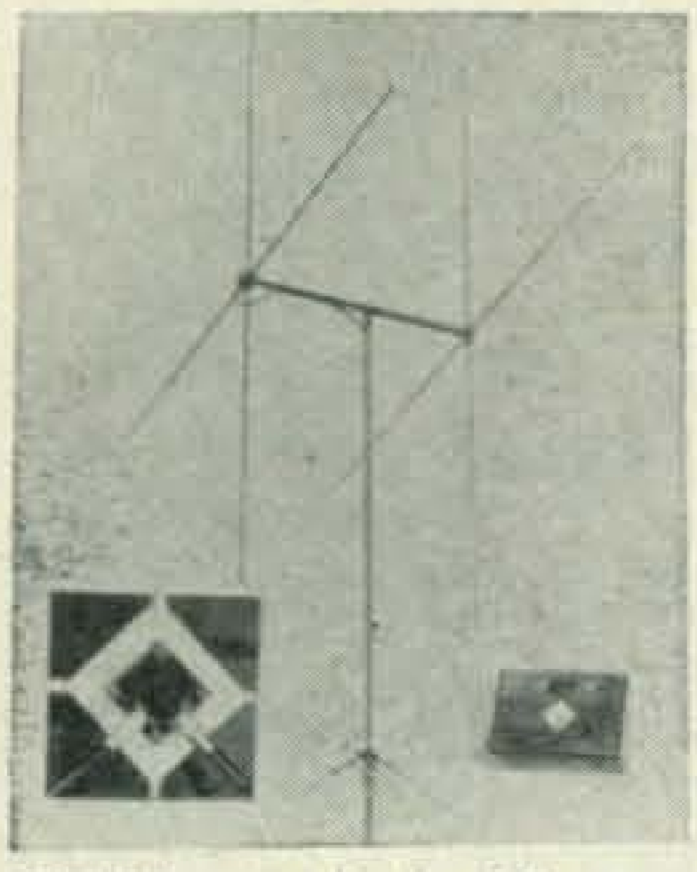
General Industrial Co., is now producing a handy circular slide rule which performs simple calculations in multiplication, division and proportions. It has a 4" diameter and sells for $.50. For more information write to them direct at 1788J Montrose Ave., Chicago, Ill., 60613 or circle 66 on page 110.

Allied

Knight
MOTOR SPEED LIGHT CONTROL

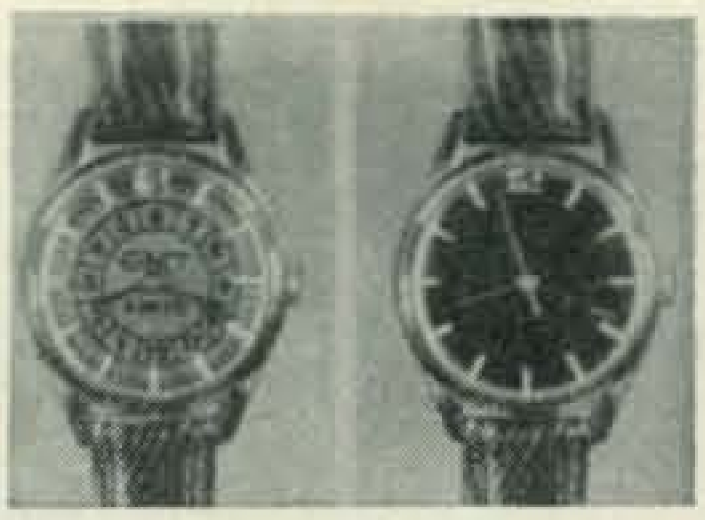
Knight-Kit announces a new addition to their line. It is a motor-speed/light control kit which handles resitive loads up to 900 watts and incandescent lamps up to 500 watts. The kit is priced at $9.95. For complete specs write to Allied Radio Corp., 100 N. Western Ave., Chicago, Ill., 60680, or circle 67 on page 110.

Avanti R&D



The Antenna Div. of Avanti R&D has developed a polar diversity antenna designated the Avanti PDL. For a complete list of models and specs write to The Antenna Division Avanti R&D, Inc., 45B Fullerton Ave., Addison, Ill., 60101, or circle 68 on page 110.

Nordlund



By use of a patented dial display mechanism, this Swiss watch shows users local 12-hour time on a gold & black dial for 20 seconds, then the GMT dial emerges into view for 15 seconds, after which it disappears completely and the cycle repeats. The watches are priced at $17.95 with optional GMT dial for any specified time zone. More information can be had by writing Nordland Products, 7635 West Irving Rd., Chicago, Ill., 60634, or circling 69 on page 110.

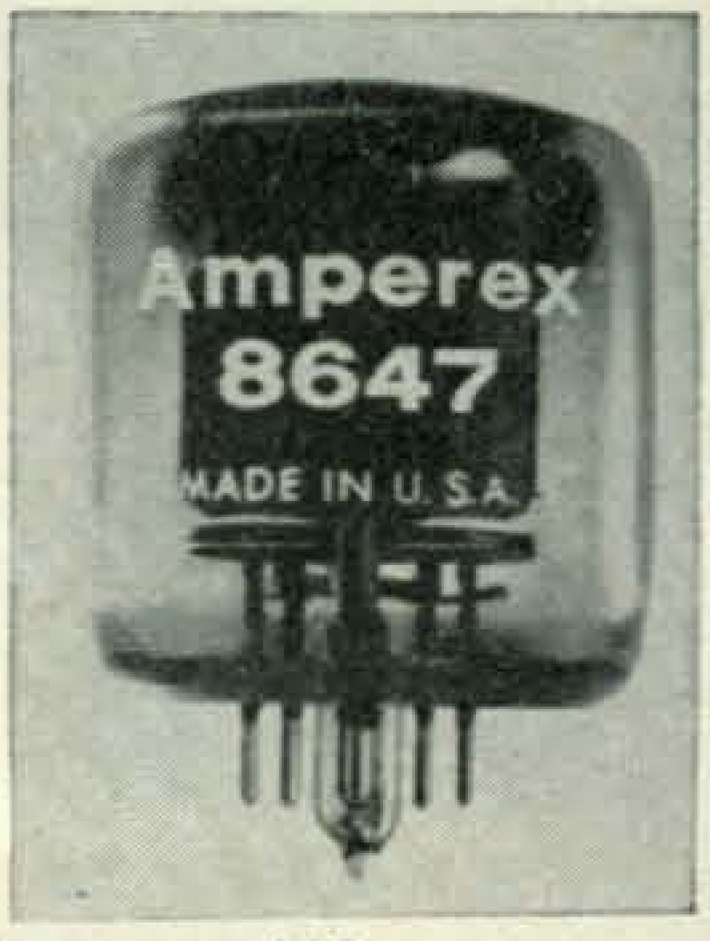
Semitronics

The Model 1000 Semitronics transistor tester and set analyzer is completely self-powered, portable, is actually 8 analyzers in one unit. It can be used as a transistor tester, a diode tester, as a wattmeter, an ammeter, a signal generator, an in-circuit tester, and will also function as an a.c. and d.c. beta tester. It retails for $34.95. For further information write to Semitronics Corp., 265 Canal St., N. Y., or circle 70 on page 110.

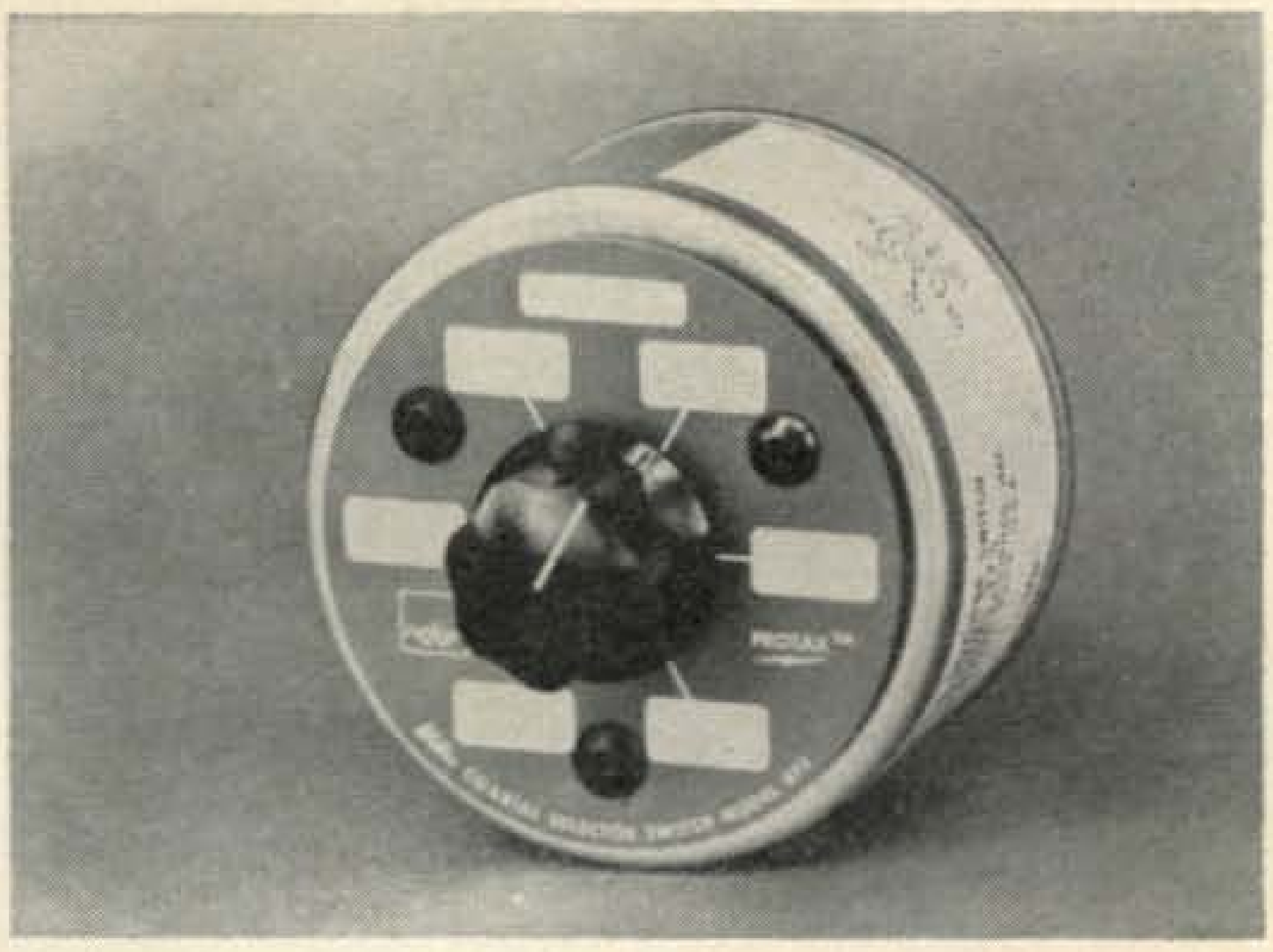
Am. Teletronics

Here is a five ounce unit, called "Shoulder Talk," that indicates either C.D. or emergency potential. Designed to operate with either packsets or transceivers it allows hands-free operation. The unit has a two-inch speaker and a goose neck mounted microphone with provision for adapting the safety helmet as an antenna. For details and pirces write to American Teletronics Corp., 4444 Geary Blvd., San Francisco, Calif., 94118, or circle 71 on page 110.

Amperex



The 8647 is an instant heating derivative of the 8505. It is an r.f. amplifier, oscillator and frequency multiplier up to 250 mc. For further information and application notes contact Amperex Electronic Corp., Power Tube Dept., Hicksville, L. I N.Y., 11802, or circle 72 on page 110.



The Waters Model 375 "Protax" coax switch. The connectors are mounted axially on the rear. Erasable identifications at each position may be marked in the blank spaces. The connectors on the Model 376 are mounted radially around the sides of the case.

CQ Reviews:

The Waters "Protax" Coaxial Switches

BY WILFRED M. SCHERER,* W2AEF

An addition to the Waters line of coaxial switches is the "Protax" antenna switch with automatic grounding, the Models 375 and 376. The functional arrangement for each switch is shown at fig. 1.

Model 376

The Model 376 switches a common input connector to one of five output connectors, thus enabling the station equipment to be connected to various separate antennas or to a dummy load. All unused connectors are grounded and shorted to the case, thereby minimizing the possibility of stray r.f. feedthrough or crosstalk.

When the switch is placed at a sixth position, the equipment at the input is disconnected and *all* the outputs are shorted and grounded. With an external ground connected to the case, the entire antenna setup is thus grounded, providing a path for draining off static charges and in certain cases offering a measure of lightning protection.[1]

The switch is fully shielded in a round-shaped sealed metal case which is equipped with SO-239 type coax connectors that protrude radially from the sides of the case and thus make the unit suited for wall installations for which mounting brackets are included (panel-mounting also may be made). It is furnished with a knob and an escutcheon plate that has blank spaces at each position and on which erasable identifications may be marked. A ground lug is provided for connecting the case to an external ground.

Model 375

The Model 375 Protax switch is similar to the Model 376, except the connectors protrude axially from the rear of the case, making it particularly suited for panel-mounting or installation in close quarters. In addition, there are six output positions, but only five can be grounded at one time.

Where five or less positions are needed for antennas, the sixth position may be used for a dummy load, as grounding it will not be required. Setting the switch at this position will then ground the entire antenna system as with the Model 376.

Ratings

The switches are rotary types with ceramic insulation. All internal conductors and the current-carrying parts of the switches are silver-plated. The units are designed for use with 50-ohm lines with which the s.w.r. is rated at less than 1.3:1 up to 150 mc. With voltage and current ratings of 500v. and 5a. respectively, the switches will easily handle 1000 watts of r.f. power; however, they are not designed to be switched while power is applied. Cross talk and insertion loss are rated as being negligible.

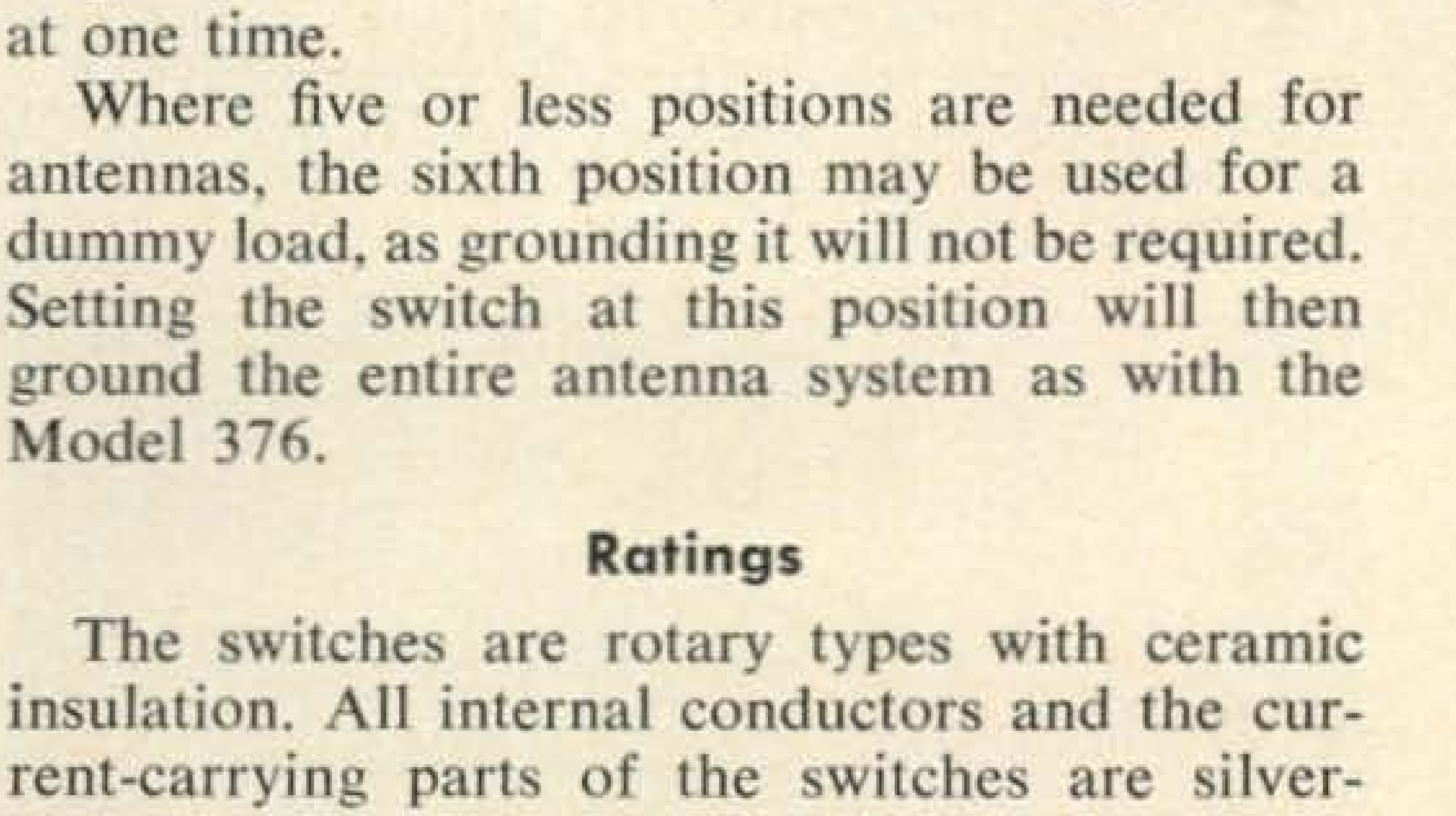


Fig. 1—Functional diagrams for the Waters "Protax" coax switches. The letter C denotes the common terminal.

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*Technical Director, *CQ*.

[1] From nearby lightning strikes, but in the case of a direct hit, there is no assurance of complete protection.

Measurements made on the Model 375 were as follows: S.w.r., 1.2:1 at 144 mc; cross talk, −45 db at 30 mc; −35 db at 50 mc; insertion loss, less than 0.1 db at 144 mc.

Mechanical specifications for the switches are:

	Model 375	*Model 376*
DIAMETER:	4⅛″ max.	4″ over connectors
LENGTH BEHIND PANEL:	2½″ Over connectors	2″
SHAFT LENGTH:	7/16″	7/16″
FINISH:	Both models—electro-tin plated steel	
WEIGHT:	13 oz.	13⅛ oz.

The switches are marked with either a diagram of the functional setup or with terminal numbers corresponding to the positions on the escutcheon plate.

Where the grounding feature is not desired or for other switching configurations, the standard Waters coax switches may be used.[2]

The waters "Protax" coax switches are priced at: $13.95 for the Model 375; $12.50 for the Model 376. They are supplied with all mounting hardware, knob, dial plate and instructions. Another Protax switch, just announced, is the Model 380, priced at $12.45. It switches the input to one of two outputs and has an OFF position that disconnects and grounds both outputs. The producer is Waters Manufacturing, Inc., Boston Post Road, Wayland, Mass. 01778. —*W2AEF*

CQ Reviews:

The Waters Dummy Loads and Wattmeter Models 374 and 384

BY WILFRED M. SCHERER,* W2AEF

THE original Waters Dummy Load/Wattmeter Model 334[1] has proven to be a highly successful and popular device for use with r.f. power up to 1000 watts, but to meet the demand for higher-power capabilities, the Waters line has been extended to include the Model 374 Dummy Load/Wattmeter which permits power readings up to 1500 watts, and the Model 384 which is just a dummy load for handling a like amount of power. Both models provide a nominal 52-ohm termination with an s.w.r. of under 1.3:1 from d.c. to 230 mc.

DUMMY LOAD
MODEL—384
ELECTRICAL SPECIFICATIONS
POWER RATING:
1.5 KILOWATTS FOR 4 MINUTES.
50 WATTS CONTINUOUS
DO NOT OPERATE OVER 50 WATT
LEVEL UNLESS LINE CORD IS CONNECTED.
VSWR:
LESS THAN 1.3:1 D.C. TO 230M.C.
IMPEDANCE:
52 OHMS
OVER TEMPERATURE INDICATOR
PRESS TO TEST
Waters MANUFACTURING INC.

The Waters Dummy Load Model 384. It is a 52-ohm termination designed for use at power levels up to 1500 watts from D.C. to 230 mc. The warning lamp is at the lower center with a test button just below it.

Model 374

The Model 374 has four calibrated wattmeter scales to facilitate reading intermediate power levels. The full-scale ranges are: 0-15; 0-50, 0-300 and 0-1500 watts with a rated accuracy of ±5% of full scale value on each range at frequencies of 2-30 mc. The wattmeter may be used at higher frequencies also; however, the stated accuracy does not apply and the power readings will be relative indications only.

The load impedance is an especially-made monolithic non-inductive resistor which has a tap from which a low-voltage sample of the r.f. potential across the resistor is applied to a solid-state diode used to produce a related d.c. potential for operating the meter. The stated accuracy is restricted to 2-30 mc due to limitations imposed by the diode characteristics. The wattmeter circuitry is shown at fig. 1.

The load resistor is immersed in 2⅝ quarts of controlled-dialectric oil which serves as a coolant for dissipating the heat that is induced into the resistor by the r.f. power. The load element is completely shielded in a steel metal case which also contains the coolant. R.f. radiation from the load is thus prevented.

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*Technical Director, *CQ*.

[1] "*CQ* Reviews: The Waters Model 334 Dummy Load—Wattmeter," *CQ* Aug. '63, page 30.

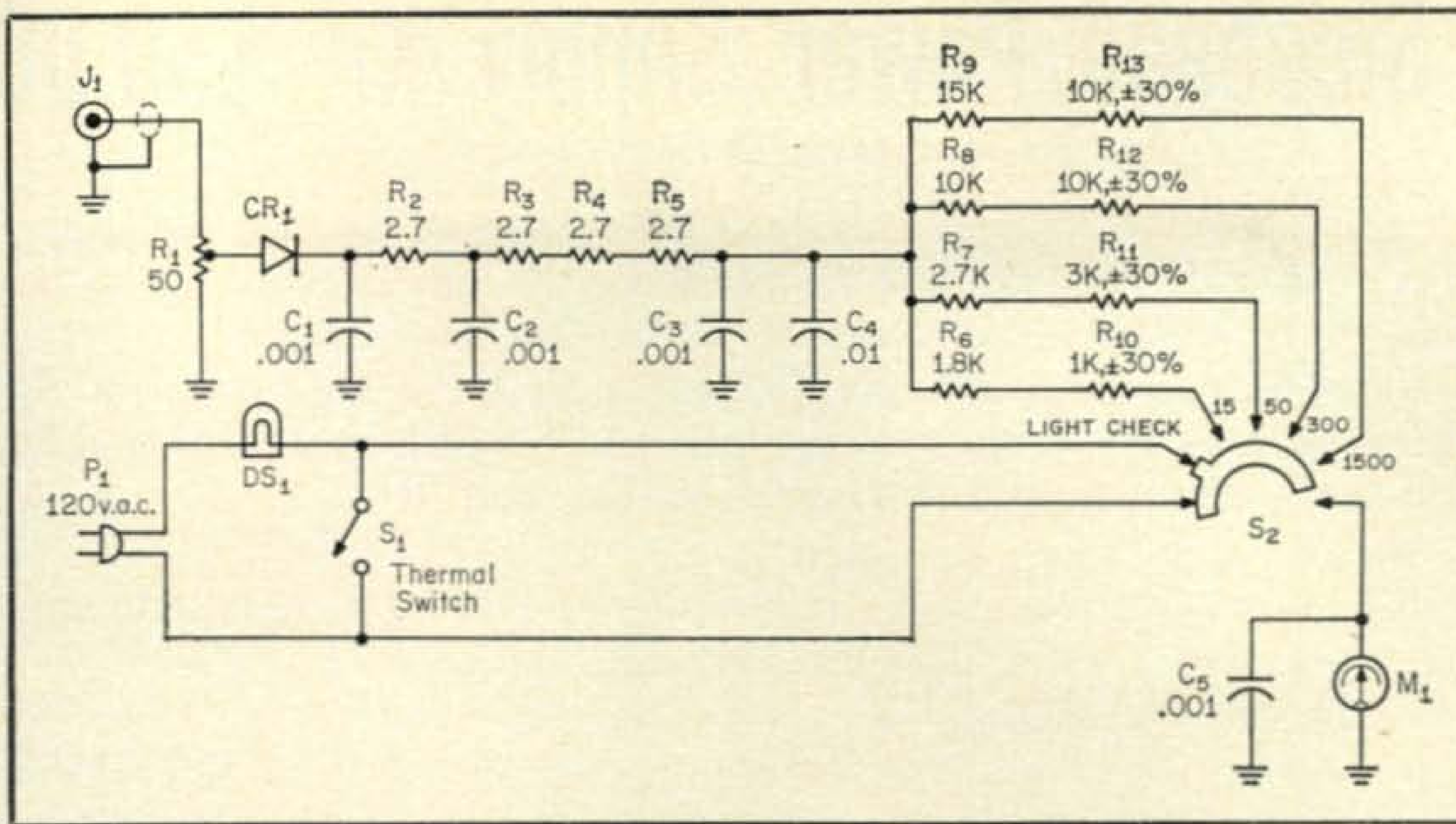

Fig. 1—Schematic of the Waters Model 374 Dummy Load/Wattmeter. Resistor R_1 is the specially designed 30 ohm load resistor.

When a liquid coolant is used, during operation it will expand as the temperature rises and thus a pressure can be built up within the case if it is a sealed one. Although this could be avoided by a relief vent, such a step might result in the mess of spilled oil either during transportation or in the event of excessive pressure. Another situation that might arise is a very high temperature rise that could damage the wattmeter diode which is immersed in the oil along with the load resistor.

To forestall these consequences, the container for the Waters unit is a completely sealed welded-steel tank in which is mounted a thermal switch that closes and actuates a warning lamp on the panel of the instrument when the temperature nears the danger point (220°). Power for the lamp is obtained from a 117 v.a.c. source. For field use, the lamp may be changed for 12 v.d.c. operation. A test position on the power-range switch is provided to make sure the lamp will light up.

A continuous power of 1500 watts may be handled for about 4 minutes before the warning lamp goes on; while at lower-power levels, continuous operation may be made over proportionately longer periods. Typical ratings are: 1000, 500, 250 and 100 watts for 5, 10, 25 and 70 minutes respectively. A graph, furnished with each unit, indicates the continuous-power rating v.s. time. Intermittent use with a given power may be made over longer periods, depending on the duty cycle. Once the warning lamp has gone on, a cooling period of about 90 minutes (at normal room ambient) is necessary, before operation can be safely resumed. The cooling period might be decreased by placing the instrument in a cool spot, such as out of doors and where there is freedom of air movement.

Although the terminating resistor is designed for a constant impedance with a maximum s.w.r. of 1.3:1 up to 230 mc, the unit also may be used as a load at frequencies up to 450 mc; however, above 230 mc the impedance of the resistor rises with a consequent increase in the s.w.r. In addition, when operation is conducted in this region, power should be limited to 250 watts.

In order to prevent burnout of the wattmeter diode, the maximum allowable power under any condition is 1500 watts. In the case of an a.m. signal, the maximum permissible carrier with 100 per-cent modulation applied thus will be 375 watts, since the peak modulated power will be four-times the carrier, or 1500 watts.

The instrument is housed in a light-gray perforated steel case that has a sturdy carrying handle. The panel is a darker gray. The power meter is recessed behind a bevelled escutcheon and when the warning lamp goes on, it casts a red light on the meter. The input connector is at the rear and it accepts a PL-259 type cable plug. It is a special type which is hermetically sealed to prevent oil leakage through it and, in

[*Continued on page 98*]

DUMMY LOAD—WATTMETER
MODEL-374
TURN OFF WHEN RED
TRANSMITTER LIGHT IS ON
FULL SCALE POWER IN WATTS
LIGHT CHECK
15
50
300
1500

The Waters Dummy Load/Wattmeter Model 374. It reads power up to 1500 watts at 2-30 mc and may be used as a 52-ohm dummy load from d.c. to 230 mc. The left-hand position at the range switch is used to check the lamp which warns of over-temperature.

"Universal Sideband Power Supply Kit $50.00"

FOB Harvard, Massachusetts

We are in the Ham business. We literally sell hundreds of transceivers, new and used, over a year's time. There seems to be a common requirement amongst all the manufacturers with respect to power supply needs. Very few of the standard brands include the power supply as part of the transceiver chassis.

Frankly, we are offering these kits as an inducement to sell more transceivers. We feel that any move which has the effect of making Sideband more readily available pricewise is an over-all advantage to both of us. This kit was engineered to be better than any of the existing contemporary power supply designs; the kit weighs 45 pounds. It includes the following components.

1	17" by 10" by 3" 16-gauge black crinkle chassis and bottom plate to match
1	large P.M. Speaker
1	matching plug to mate with your transceiver (When ordering, tell us what set you want to use it with)
2	225-watt power transformers
1	500-mill filter choke
1	300-mill filter choke
2	80 mfd, 500-volt capacitors
4	400 mfd, 300-volt capacitors
2	50 mfd, 150-volt capacitors
12	800 P.I.V., 750 mill epoxy diodes
2	50 volt, 1 ampere diodes
4	25K, 10-watt resistors
3	power resistors
1	line cord
1	fuse post and fuse
1	length of 8 conductor cable
	Detailed instructions and schematic

The result of all these parts is that you will have a more rugged, better regulated power supply than anything that you can normally buy for up to twice this sum of money. This power supply kit, when wired to the instructions shown, will meet the requirements of Swan, Eico, National, Hallicrafters, Collins, and Drake Transceivers—as well as most transmitting exciters.

It furnishes between 700 and 1,000 volts at up to 500 mills on peak. (The design permits different voltage outputs.)

It furnishes between 275 and 325 volts at up to 300 mills.

It furnishes a bias of up to 100 volts at 100 mills.

It furnishes 14 volts of d.c. for relay operation.

It furnishes 12.6 volts or 6.3 volts at up to 7 amperes for filaments.

There is no substitute for copper and steel in a power supply. You pay for what you get in this world. The power transformers in this set weigh 17 pounds. Compare this figure with any other similar product and decide for yourself where the value is. The finished product is so rugged and capable—that you won't be able to hear it groan as you load up.

In one-eight-hour session you can easily build a valuable accessory to your station and which you can use repeatedly for all modern transceivers. If you wish to upgrade your station from A.M. to Sideband, consider purchasing one of these transceivers kits. If you plan on buying a new transceiver, this supply will positively take care of the requirements and save you money as well.

This supply provides 100 mfd of filtering at 1200 volts—assuring you of greater dynamic range and consequently better transmitting capability. It may not be as pretty as the factory-supplied console—but you can put the unit under the operating desk—out of sight—and save space as well as money.

HERBERT W. GORDON COMPANY

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For further information, check number 21, on page 110

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CQ

ANTENNA ROUNDUP Vol. II

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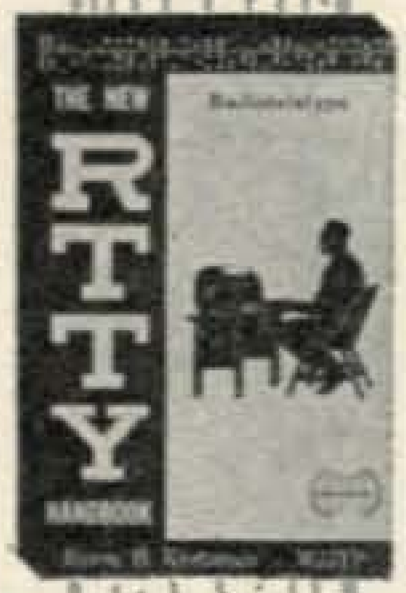

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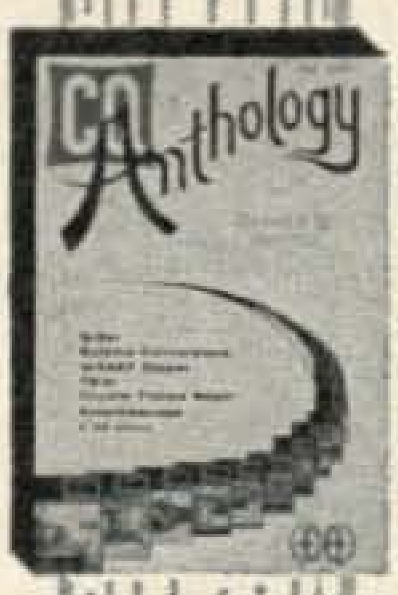

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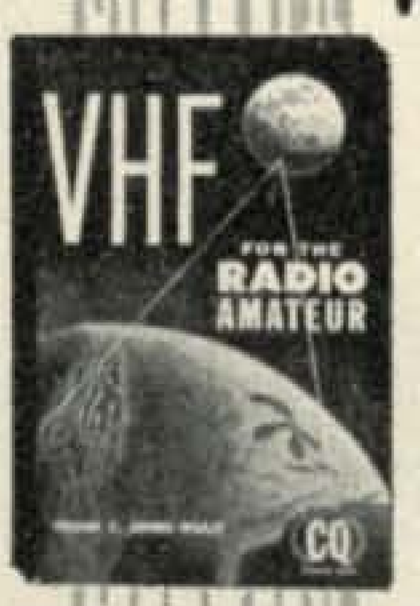

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Antenna Roundup
CQ
Edited by: ART SEIDMAN, K2BUS

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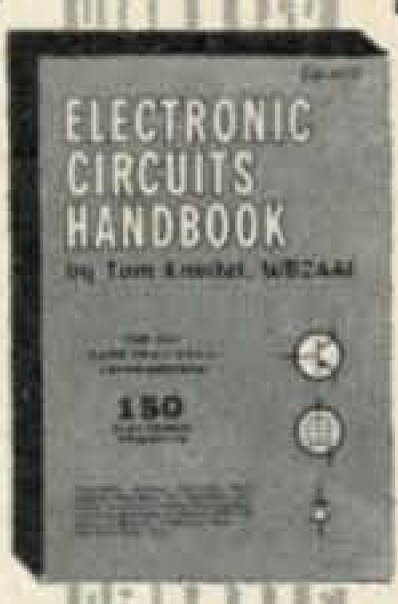

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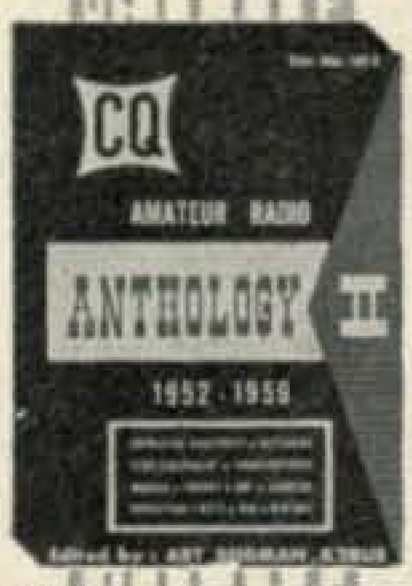

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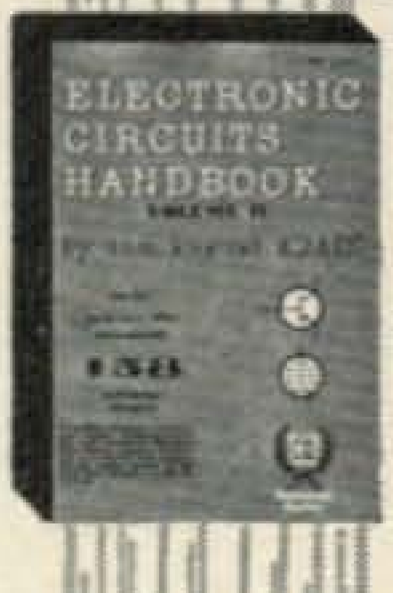

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$5000 For The Future—Revisited

BY BOB ROGERS, WA5NBB, AND PAUL CLAMPIT,* K5TCK

On December 26, 1966, ARS W5YM began a continuous 144-hour on-the-air survey of the amateur radio operator's opinion on incentive licensing. The survey was presented in the form of a ballot with six questions which pertained to incentive licensing and general improvement of the amateur service. Details of the survey and a copy of the ballot appeared in the December issue of *CQ*. The survey ended as the new year began here at the University of Arkansas. At that time almost 2000 amateurs had voted.

As the saying goes, "It's all over but the shouting." And, fortunately, the shouting has also calmed down quite a bit. The purpose of this article is, of course, to inform you of the results. But we would also like to mention a few of the events that occurred along the way.

Among the more amusing incidents, one of the people keeping the log fell asleep in the middle of a transmission—he got the call but missed the vote! One opeartor arrived to find a note to the effect that the swing shift was too much for the previous operator and the station had been QRT for two hours! As might be expected within seven minutes after the start of operation the receiver seemingly bit the dust—a loose r.f. cable! We even received a call from the Dominican Republic, and had to inform him he couldn't vote!

Everything considered, the survey went pretty well. Most of the people who called in the spirit and helped by voting and even relaying for us. Some amateurs were not in complete agreement with the idea. We want to thank those who disagreed and were forthright and courteous with their comments.

There were several stations who relayed for us for many hours. We owe them a debt of gratitude for their outstanding support.

We are aware that we missed several stations for one reason or another and we apologize to them. One amateur was more deliberate than most. We received a letter from him after we were through. It said, "First my transmitter quit and I repaired it. Then my antenna tuner went out and after I got it fixed I couldn't get through the QRM. So here is my vote. . . ." One hardy individual in Minnesota raised an eighty meter antenna in zero degree weather so that he could vote!

Now let's get down to brass tacks. Total votes received was 1893. Only one state was not represented. Where were you, New Hampshire? In addition to the states, votes were received from: Guam, Guantanamo Bay, and Truk.

There were several comments and they have been included in the communication to the FCC. However, there isn't space here to try to cover all of them. We hope you find the results interesting and if you participated we hope you enjoyed it. ■

Results

Total votes: 1893

Total votes from each call area:

Area	*Votes*	*Area*	*Votes*
1	29	6	138
2	68	7	155
3	58	8	155
4	195	9	168
5	612	0	315

Total votes on each question:

1. Code examination speed for General License:

a. 13 w.p.m.	1601
b. 16 w.p.m.	237
c. 20 w.p.m.	54

2. Theory examination for General License:

a. Same as present	1318
b. More comprehensive but less than present extra class exam	515
c. Equal to present extra class exam	59

3. Regulation examination for General License:

a. Same as present	1338
b. More comprehensive	545

Requirements for first license renewal:

4. Written:

a. Advanced theory exam	180
b. Same exam repeated	241
c. No further exam	1471

5. Code:

a. Advanced	124
b. Same exam repeated	305
c. No further exam	1463

6. Advanced license classes (above general):

a. Advanced operating privileges	874
b. Same as general privileges	1013

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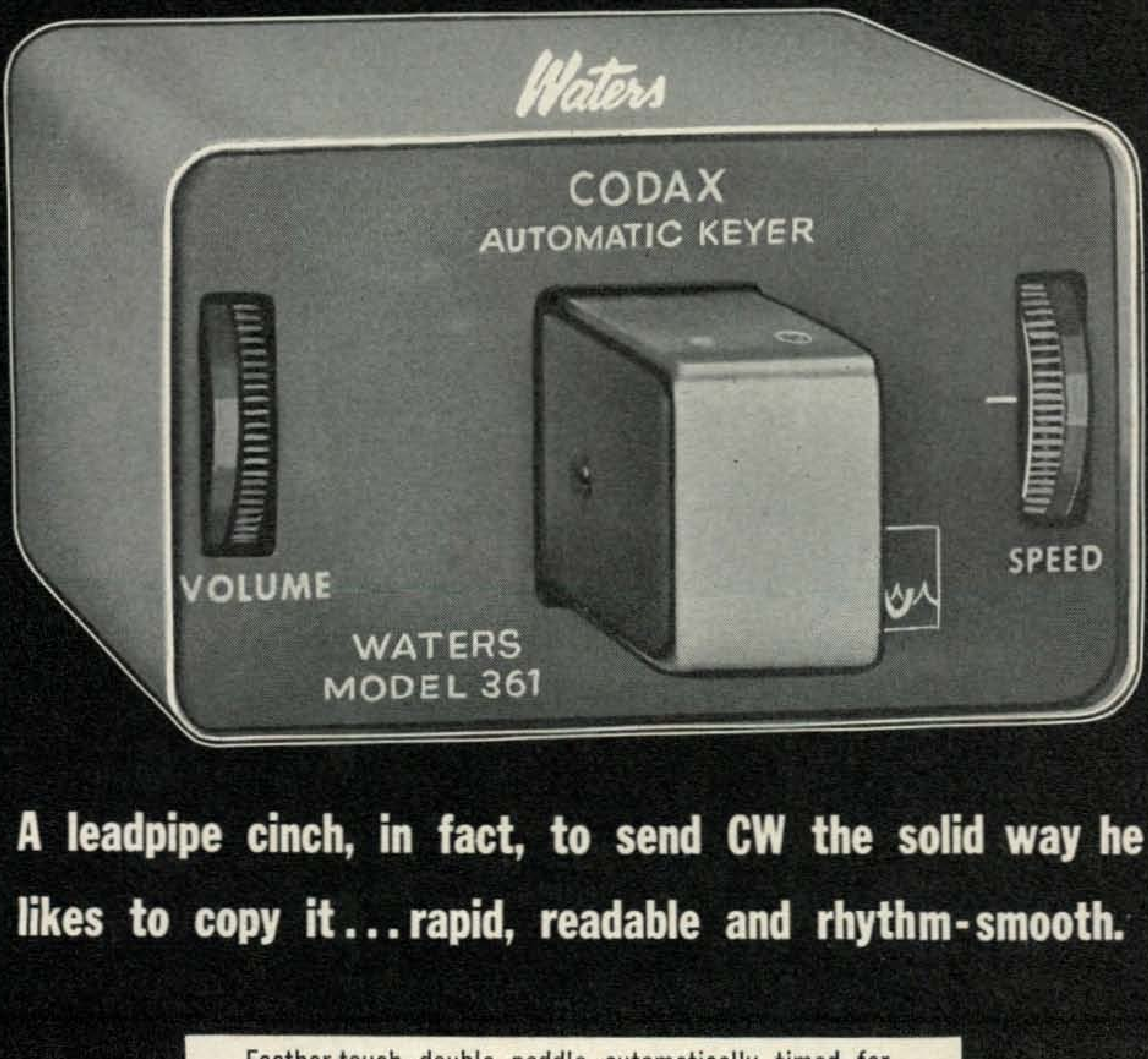
*W5YM Amateur Radio Club of the University of Arkansas, Inc. Department of Electrical Engineering, University of Arkansas, Fayetteville, Arkansas.

It's really a cinch, Penelope...

for the ham with a CODAX Keyer!



A leadpipe cinch, in fact, to send CW the solid way he likes to copy it... rapid, readable and rhythm-smooth.

Feather-touch double paddle automatically timed for 5 to 50 WPM. Operates block grid or into mike jack for VOX CW on **either** sideband. Monitors the signal, too!

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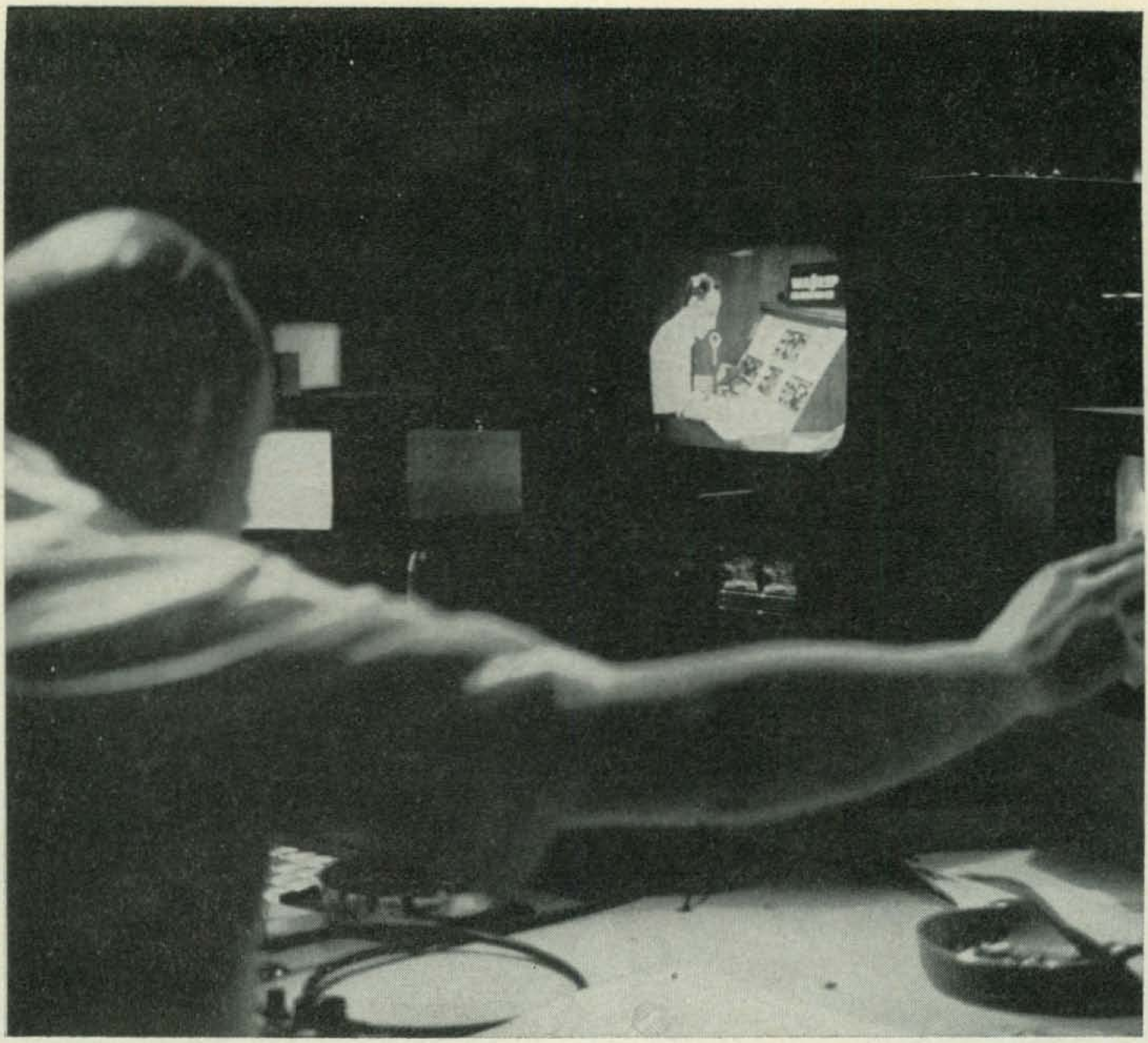
For further information, check number 23, on page 110



Jim Roper, W9JSW and news editor for WLFD television, mans the Field Amateur Radio station WA9RTP and relays storm reports live over WFLD. This view is from the control room with the studio engineer checking a monitor.

Station-Within-A Station "Stars" During Chicago Blizzard

A CRITICALLY ill child flown to a hospital by helicopter; an amputee rescued after 12 hours in his trapped car; thousands of worried motorists about to leave work for home told of safe routes to take:

Only three of the many emergency services performed through the help of amateur radio operators in cooperation with a Chicago television station during the Midwest's record-breaking January storm that dumped more than two feet of snow on the Chicago area in less than 30 hours, virtually paralyzing a city of millions.

The communications operation — which involved more than 150 radio opeartors relaying messages live over a major television outlet under emergency conditions—was a "first" for both amateur radio and telvision.

Credit for this performance goes to the hams who stood by their rigs for many hours over the two-day storm period and the close working relationship between the Field Amateur Radio, Club station WA9RTP and the Field Communications Corporation TV station, WFLD, channel 32, Chicago.

The FAR Club station is located in the studios of WFLD only a few feet from the micro-

WA9RTP enjoys not only a thrilling view of the Chicago skyline, but also a 575-foot-high antenna location making its dipoles sound like well-tuned beams!

Members of Field Amateur Radio test the club's station WA9RTP. Seated left and right are: Dick Cox, K9PGN, club vice president; and Dr. George Anast, WA9IEN, club president. Standing from left are: Bill Collier, WA9CQN; Ralph Zuccarello, K9VLE; William Kusack, W9QEE; and Howard Caplan, W9ALV.

phone of channel 32's on-camera news desk. The ham facilities had been set up for several weeks prior to the storm, but the blizzard provided the first opportunity for area-wide service. Now field-tested, ham-television programming is being planned on a regular basis.

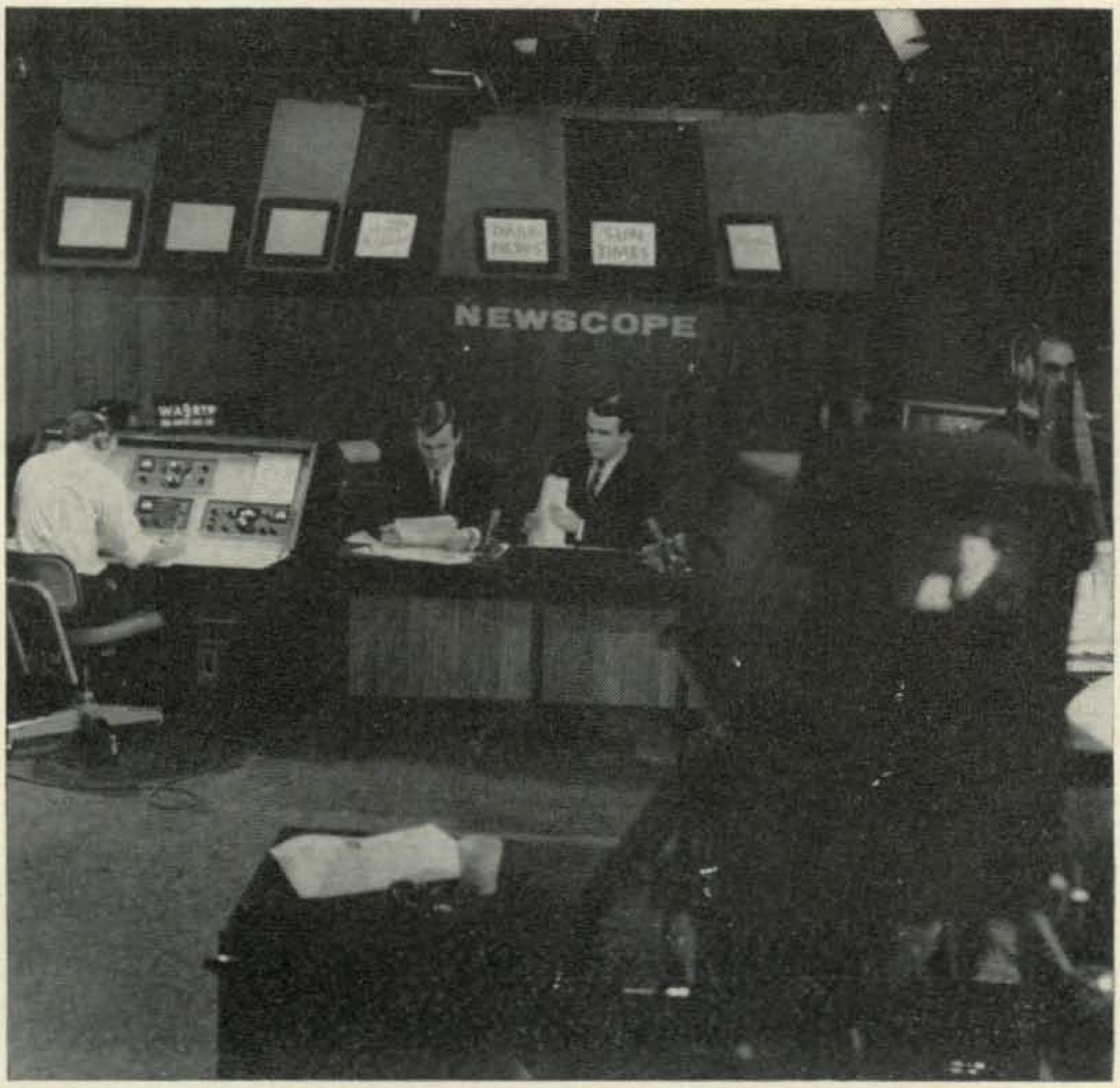
The tie-in between the two communications media was conceived by Sterling C. Quinlan, station manager for WFLD; George Anast, WA9IEN and now president of FAR; and William Kusack, W9QEE and WFLD chief engineer.

Commenting on the ham-TV relationship, Quinlan said: "It is natural for WFLD to be associated with an amateur radio operation, just as it is natural for WFLD to work closely with two Chicago daily newspapers. It's just another way in which our station illustrates its willingness and ability to better serve the people in the Chicago area."

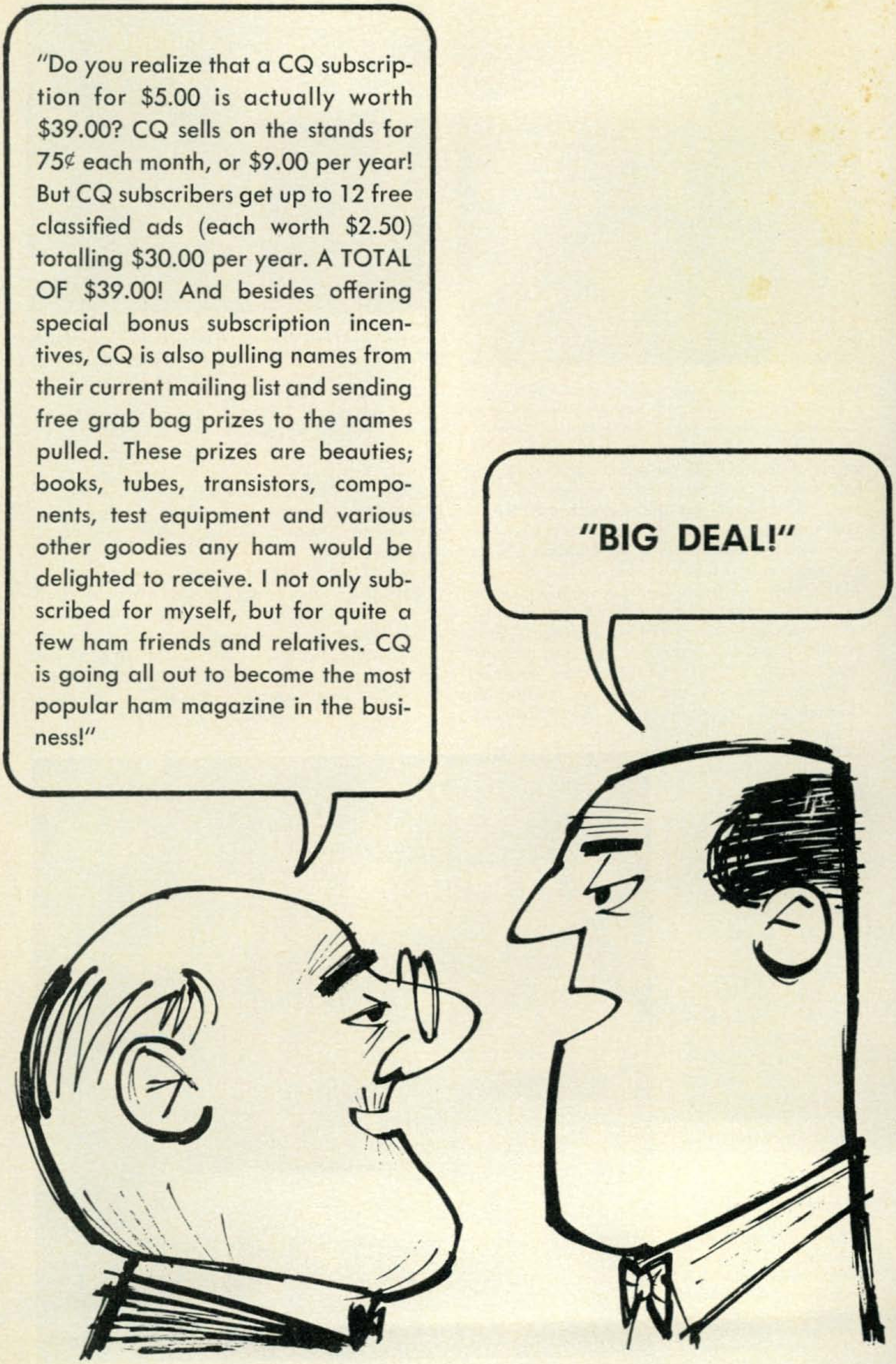
Since it went on the air a year ago, WFLD has maintained automatic cameras in the newsrooms of the Chicago Sun-Times and Chicago Daily News. These cameras are turned on to get first-hand, live reports from newsmen whenever necessary. During the storm, more than 70 television reports were delivered by the two newsrooms, the majority of the information related to the storm.

WFLD and WA9RTP started their historic combined broadcasting shortly after noon on Friday, January 27. Going on the air more than three hours ahead of schedule and pre-empting regular programs until 10:30 P.M., WFLD and the ham station during the first day brought 10 hours of continuous live reports on the storm

[*Continued on page 96*]



Jim Roper, W9JSW and WFLD news editor, left, mans the Field Amateur Radio station while Bob Hale, center, and Patrick Muldowney, WFLD news announcers, report on the day's storm activity.


"Do you realize that a CQ subscription for $5.00 is actually worth $39.00? CQ sells on the stands for 75¢ each month, or $9.00 per year! But CQ subscribers get up to 12 free classified ads (each worth $2.50) totalling $30.00 per year. A TOTAL OF $39.00! And besides offering special bonus subscription incentives, CQ is also pulling names from their current mailing list and sending free grab bag prizes to the names pulled. These prizes are beauties; books, tubes, transistors, components, test equipment and various other goodies any ham would be delighted to receive. I not only subscribed for myself, but for quite a few ham friends and relatives. CQ is going all out to become the most popular ham magazine in the business!"
"BIG DEAL!"

All-Band Coverage from the Ham-Band-Only Receiver:

The OMNIVERTER

BY WILFRED M. SCHERER,* W2AEF

Part III — Alignment

This concluding installment covers the alignment procedures for the Omniverter and includes corrections and notes to date.

Alignment

BEFORE applying power, check the wiring against the drawings and with the schematic diagram to make sure you (or we!) have not made an error or omitted some step. Then temporarily install knobs[1] on the controls and install tubes. Do not mount the panel yet. Place the function switch at the CALIBRATE position and temporarily wrap tape around its terminals to prevent bodily contact. Also tape a piece of cardboard on the rear of the power-supply board. Push the slide switch on the calibrator *case* to OFF and install a short-circuited phono plug in the a.g.c. jack.

Plug the line cord into a power outlet. The 0A2 should glow. Check for correct B-plus voltages at TS_3 and TS_6. Remove power and disconnect the B-plus end of R_{30} on the synthesizer. Set the synthesizer switch with the wiper of S_{3C} at the contact for terminal 3 (fig. 10).[2]

Apply power and adjust L_{30} for oscillation of the 44.5 mc crystal as determined by using a g.d.o. as a diode detector (or other wavemeter) coupled to L_{30} or with an r.f. probe with v.t.v.m. connected at pin 8 of V_{4A} (the reading should be 0.5-1.0v.). Similarly check operation of the four other high-range crystals by rotating the switch to the corresponding positions (contacts at 4, 5, 6, 7).

Adjust L_{30} for a single adjustment that produces oscillation of all these crystals and which produces the highest average output. Make sure the frequency of oscillation is correct in each case. Also check the operation with the switch at all the other positions.

Remove power. Disconnect the B-plus end of R_{39} at TS_6 and reconnect R_{30}. Set the synthesizer switch at 3.

Apply power and check for oscillation of the 23 mc crystal as determined with the g.d.o. coupled to L_{29} or with the r.f. probe for 0.1-0.2 v. at pin 8 of V_{4A}. If oscillation is not indicated, L_{29} may have to be altered by adding turns.

Oscillation should be maintained at the same frequency with the switch at points 4, 5, 6, and 7 also. Next, check points 8, 9, 10, 11, and 12 for 25.5 mc; points 13, 14, 15, 16, and 17 for 28 mc; and points 18, 19, 20, 21, and 22 for 30.5 mc. Make certain the correct frequency is produced in each case. Where this does not occur or if oscillation does not result, alter L_{29} as described above; however, the inductance of L_{29} should be kept as low as possible consistent with obtaining oscillation at the correct frequencies (NOTE: slug-tuned coils are not used at L_{29}, since they usually do not work out well in this case).

Remove power and reconnect R_{39}. Set the switch at 3, apply power and adjust L_{40} for maximum mixer output at 21.5 mc as indicated by g.d.o. detector coupled to L_{40}, or for a reading of 0.2 v. at the test point at the feedthrough bushing near the converter-mixer tube. Set the switch at point 4 and adjust the 21 mc trimmer (see fig. 10) for an indication as described above. Follow through with the same procedure at the remaining switch positions, each time adjusting the associated trimmer for the indicated heterodyning frequency. Remove power.

Make dial scales on heavy white paper as shown at fig. 11 and paste them on the corresponding dials.

Install the preselector dial on the drive unit so that the low-frequency end of the scales will be "straight up" (positioned at top center) when the capacitor plates are fully meshed. The set screws at the coupling may have to be loosened to allow correct positioning. Rotating the capacitor (clockwise) to minimum should then place the high-frequency end up. Set the r.f. range switch for the 5-17 mc range for which the wipers on the switches should be at position F as indicated on S_{2F} at fig. 9. Similarly set the i.f. output switch for 29 mc with the wiper on S_{1E} position at L_{19} as indicated in fig. 9. On the calibrator case, push the slide switch to ON. Set the preselector capacitor at 16 mc (range F) and the synthesizer switch to the position, 20, that corresponds to the 13 mc trimmer (fig. 10). R.f. and i.f. gain controls should be full on.

Connect the Omniverter output to the receiver input and with power applied to both units tune

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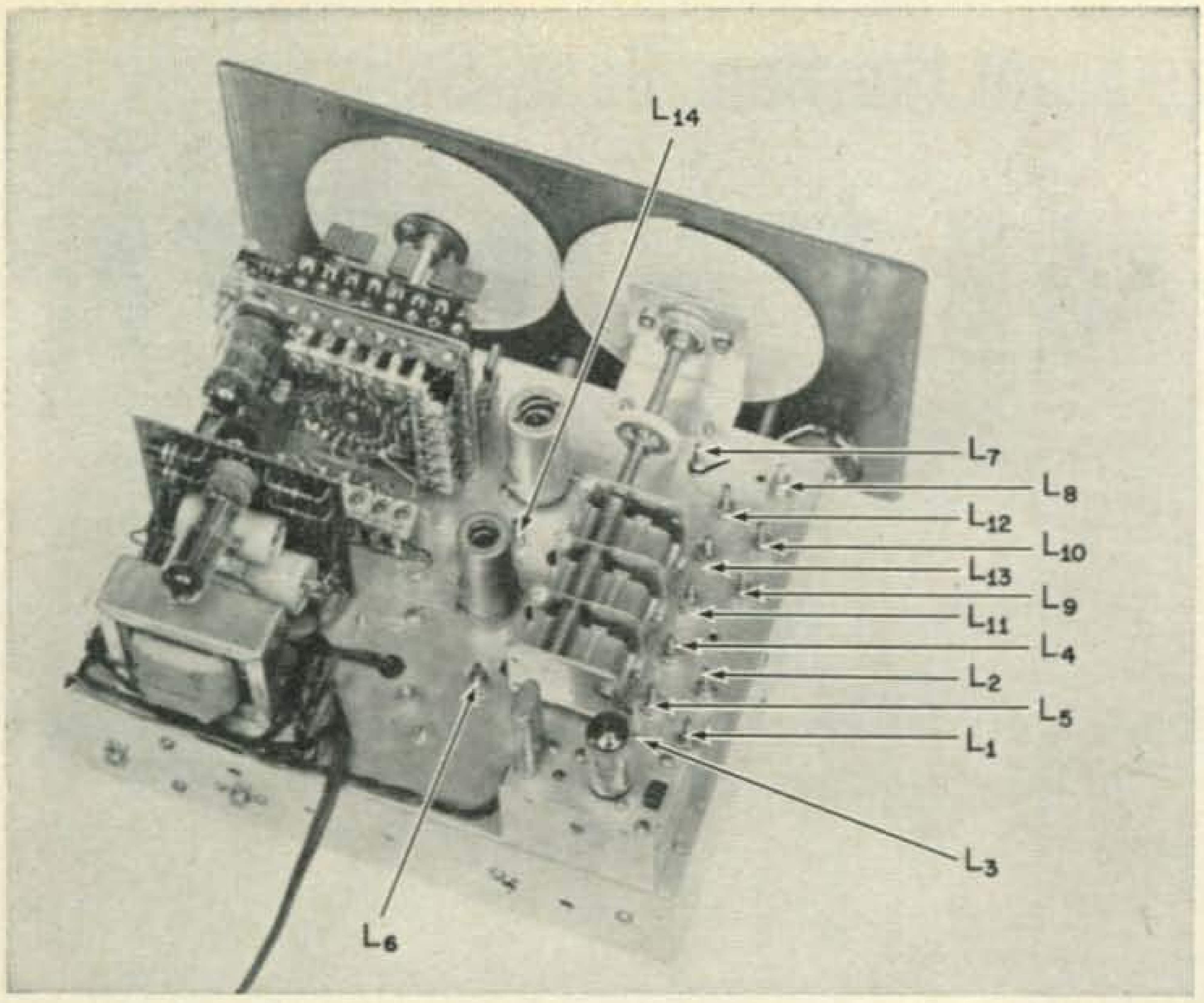
*Technical Director, *CQ*.



Top view of the Omniverter with the coils called out.

in the calibrator signal at 29 mc on the receiver. Peak up the signal by adjusting L_4 and L_{12}.

Set the synthesizer switch at 12 mc, tune in the calibrator at 29 mc and peak it up with the preselector capacitor. Tune the receiver to zero-beat and write down the deviation from the 29 mc reading on the receiver dial (it is assumed that the receiver has been accurately calibrated at 29 mc).

Next, set the synthesizer switch for 12.5 mc, peaking up the signal and recording the deviation as described above. Follow the same procedure for each successive position of the synthesizer switch. At the last position (point 3 for which there is no trimmer) the preselector dial should read near 7.5 mc. As a matter of interest during this process, you can refer to Table II in Part I to find the dial reading for each synthesizer position, but this is not necessary at this time.

If the frequency deviations are more than ±2 kc or if the receiver dial cannot be reindexed, it might be desirable to rubber the crystals for closer tolerance as follows.

It will not be necessary to pull each crystal exactly to its specified frequency, but rather, that the difference frequencies for each combination of crystals result in the exact *heterodyning* frequencies.

Check the accuracy of the 12, 12.5, 13, 13.5, 14 mc heterodyning positions using the Omniverter calibrator, r.f. range F (5-17 mc), 29 mc i.f. output and accurately calibrated receiver tuned to 29 mc as just described.

Select the synthesizer position (12-14 mc) that deviates the *greatest* amount on the *low*-frequency side of zero-beat at 29 mc on the receiver. Then add inductance in series with each of the *high*-range crystals for the *other four* positions by an amount that produces the same deviation as the selected reference position. The inductors should be wound with 10-18 turns of #28 enamel wire on 1-watt 100K (or higher) resistors. Before winding the inductors, use a file or hacksaw to cut a notch to grip the wire at each end of the resistor body.

After the deviation has been made the same at all five positions, alter L_{29} (if needed) to pull one of these positions to zero-beat as indicated at 29 mc on the receiver. Extra series inductance (L_{23}) will not be needed with the 30.5 mc crystal.

Switch to the 16.5 mc heterodyning position, peak up the preselector at 12.5 mc and check the calibration accuracy at 29 mc on the receiver. If needed, add inductance in series with the 28 mc crystal to pull the signal to zero-beat.

Then switch to the 19 mc position and follow the same procedure (with preselector at 10 mc), adding the necessary series inductance to the 25.5 mc crystal.

Finally, switch to the 21.5 mc position, again following the same steps (preselector at 7.5 mc) using inductance at the 23 mc crystal.

Check the calibration for all 20 positions. Due to lead inductance between the switch positions, some variation in frequency may occur, but calibration should remain within 0.5 kc.

Final Assembly and Alignment

Remove power. Remove the tape from the function switch and take off all the knobs. Slide the synthesizer dial on its switch shaft, but do not tighten set screws. Install the panel[3] and at the same time mount the r.f. gain control and the function switch (use lockwasher between the nut and the panel). Make sure the rear terminals of the switch do not touch the chassis. Dress and lace the leads to the switch. Install all knobs, correlating their pointers with the switch positions. See fig. 9.

Set the synthesizer switch with the wiper on S_{3C} opposite terminal 4 (fig. 10). Position the dial so that the vertical row of figures, starting at the bottom with 21, are at the center of the dial window. Tighten set screws. Similarly, loosen set screws at the capacitor shaft and position the preselector dial so that the reference line at the low-frequency end of the scales is positioned vertically at the center of the window when the capacitor plates are fully meshed. Tighten set screws.

After the panel is installed and the dials properly positioned, apply the panel lettering[4] as shown in the photographs. In some cases it will be easier to apply the lettering when the knobs are removed.

At the left side of the left dial window are the figures for the r.f. ranges (see page 12, *CQ*, Feb. '67). The letters at the right of this window indicate the corresponding positions required at the r.f. range switch.

The numerals at the left of the right window indicate the 500 kc bands associated with each scale of the dial. The numerals at the right side of this window indicate the i.f. output-switch position and the range on the ham-band receiver to be used for the related 500 kc bands. The bands that appear in the vertical row at the center of the window are those available for use with the associated i.f. in conjunction with the heterodyning frequency obtained at the particular switch position. The heterodyning frequencies are indicated on the scale nearest the bottom of the window and may be used as a reference for correlating the channels according to Table II (Part I). Only the even mc are shown.

Check the i.f. output inductors as follows: Connect an r.f. probe at the Omniverter output, set the i.f. switch at the inductor position to be checked, apply power and excite the inductor with a g.d.o. (vacuum-tube type). Maximum output voltage should be indicated at a frequency within the desired i.f. range. If it does not, alter the inductor accordingly.

Alignment of the r.f. inductors is quite straight-forward and may be conducted using a signal generator (or grid-dipper signal), the calibrator, background noise or on-the-air signals. Extreme accuracy in coordinating the preselector-dial calibrations with the input-signal frequencies is not required, inasmuch as the oscillator frequencies are not determined thereby. The calibrations merely are "in-the-ball-park" references.

Set the preselector dial at 50, range switch at A, i.f. switch at 21L, synthesizer dial for 0_L (21 mc het. freq.), ham-band receiver at 21.050 mc. Apply a 50 kc test signal (the calibrator cannot be used below 100 kc) at the Omniverter input, adjusting the frequency of the *source* as needed to be heard on the receiver. Peak up the signal by adjusting L_7. Set the receiver at 21.015 mc and apply a 15 kc signal. The signal should peak up at 15 on the preselector dial. If the reading is too far off, repeak L_7. (NAA and NSS on 17.8 and 21.4 kc are convenient signal sources) Background noise with a.c. ripple often is found on the v.l.f. bands as are birdies from TV set sweep oscillators. These can be of some help during alignment.

Next, go to range B and follow similar procedures at 50 and 150 kc with the receiver set at 21.050 and 21.150 mc and adjusting L_8. For range C align at 150 and 500 kc with the receiver set at 21.150 and 21.500 mc, adjusting L_1 and L_9.

For the other ranges, set the r.f. range switch as needed and peak the associated r.f. coils with the dial set near the high-frequency end of the dial calibrations and with the synthesizer dial and the i.f. output switch set accordingly. Tune the receiver to the low-frequency end of the related ham band required for the i.f.

Note that when the calibrator is used, one or more signal beats may be heard near a given point. Select the strongest one and where several strong ones may confuse the proper setting for the coil adjustments, double check with some other known-frequency source, since an image or spurious 100 kc signal might be present.

Recheck the synthesizer trimmers for 0.2 volts at the test point (this voltage should not be higher). If an r.f. probe is not available, adjust the trimmers for maximum background noise or highest weak-signal level on the r.f. bands associated therewith.

During on-the-air operation it will be found that when the preselector is tuned to a frequency other than that of the desired signal, different signals may be heard. This is normal, as these will be the result of other mixing products. It must therefore be kept in mind that the preselector always should be tuned as nearly as possible to the desired-signal frequency only, in order to peak up that signal and obtain maximum rejection of unwanted responses.

Where the heterodyning frequency falls near that of the ham band used, desensitization of the receiver may occur, but it can be minimized by reducing the i.f. gain of the Omniverter. The effect also may be noted by a high S-meter reading when no r.f. signal is present at the Omniverter input.

Although measures have been taken in the Omniverter to minimize i.f. signal feedthrough, in actual practice i.f. signal rejection also will depend on how well the input circuits of the receiver are shielded. We've found a number of receivers that will still pick up ham-band signals, even when no antenna is connected at the receiver input.

Under certain conditions signals also may be picked up on the interconnecting cable between the Omniverter and the receiver, even though the cable is "shielded." The cable should be kept as short as possible as should a separate ground connection be made between the chassis' of the two units. An external ground also is desirable, which during v.l.f. operation also will minimize pickup of harmonics from power lines.

Corrections

At fig. 1, CR_1, CR_2 are epoxy-type silicon rectifiers, 400 v. p.i.v., 200 m.a.

At fig. 9, on S_{2A} the contact terminals are represented by tabs as they are located on the switch. On the other switches, only the wiper terminal is shown as a tab.

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[1] Small knobs: Heathkit part No. 462-191, price 70¢ ea.; large knobs: Hallicrafters part no. 015-001593.

[2] At 21 mc position.

[3] The panel should first be painted which may be done by spraying with paint available in pressurized cans.

[4] Datak "Letraset," "Tools and Workshop," *CQ*, Nov. '63, last paragraph page 54.

FALL MEETING
QUARTER CENTURY
WIRELESS ASSOCIATION INC
HOTEL SHELBURNE, OCTOBER 30, 1964

A group photo of the fall meeting of the Quarter Century Wireless Association at the Hotel Shelburne in New York on October 30, 1964.

Quarter Century Wireless Association Celebrates Its 20th Anniversary

BY JOHN DI BLASI,* W2FX

IN our radio fraternity there are Radio Clubs, Radio Associations, U.H.F. Clubs, etc., but in 1947 when the QCWA was organized, there was no association of pioneers or old timers who had started back in the early days of spark and c.w. and who were the trail-blazers who made the first transoceanic contacts. The art changes so rapidly and our memories are so very short that unless an organization was formed to commemorate and honor these pioneers their names and achievements would soon be forgotten.

Thus, during a ten meter round table on Friday night, November 4, 1947, six old timers, John Di Blasi, W2FX; Uda Ross, W2UD; John Gioe, W2FD; Edwin Crane, W2EF; Irving Groves, W2DX; and Dr. Ernest Cyriax, W2DI, decided that an association should be formed to commemorate and honor these pioneers.

The first official meeting was held in New York City, on Friday evening; December 5, 1947 at which time thirty-four charter members were present and the Quarter Century Wireless Association, Inc. was founded.

The original purpose of the QCWA is still maintained. This is, "to foster and develop friendship and cooperation among operators of twenty-five years standing" and take general interest in all matters affecting or involving amateur wireless or radio and sponsor such actions as may be deemed proper in their interests.

The Association has never actively engaged in soliciting membership, but by its continued advocating of the purpose for which it was founded, it has steadily grown to an internationally recognized fraternity of over 5000 members. Our organization is proud of its many YL members and of its growing number of husband-and-wife teams.

Our membership represents a cross-section of men and women who make amateur radio their hobby or engage in the field of modern communications or electronics. The organization is incorporated in the State of New York and there are over thirty Chapters in the United States and one in Canada actively engaged in furthering the spirit and cooperation of the "grey beards" in their locales throughout the United States and Canada.

QCWA Chapters

Current chapters are: Arizona State (Phoenix); Baltimore, Md. (Baltimore); Canton, Ohio (Massillon); Central New York, (Binghamton); Chicago, Ill., (Chicago); Cleveland, Ohio

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*Founder and President Emeritus, 155 Bay View Rd., Plandome Manor, N.Y., 11030.

(Lyndhurst); Dayton, Ohio, (Dayton); Delaware Valley, covering parts of New Jersey and Penn. (Trenton); Findlay, Ohio, (Findlay); Finger Lakes, N. Y. (Syracuse); SE Florida, (Miami); Fort Wayne, Ind., (Fort Wayne); Houston, Texas, (Houston); Michigan State, (Saginaw); Missouri State, (St. Louis); Nebraska State, (Beatrice); New England, (Hanover, Mass.); Northern California, (Redwood City); Northwest, (covering Pacific Northwest and parts of Canada and Alaska); Oklahoma state (Tulsa); Pittsburg, (Pittsburg); Reading, Pa., (Reading); San Diego, Calif. (San Diego); Susquehanna, Pa. (Lancaster); Toledo, Ohio, Toledo, Lambertville, Michigan, (Lambertville); Upper Midwest, (covering Minn., Iowa, N & S Dakota); West Gulf Coast, (Dallas, Texas); West Virginia State, (Weston), Washington, D. C. Anthracite Chapter, (Hazelton, Pa.), and Gator Chapter, (Clearwater, Florida).

National Headquarters are in New York. Each of these Chapters holds a Charter from the National Headquarters and runs its unit under the prescribed methods as outlined in the by-laws.

All members receive a Membership Certificate, Dues Card, Membership Roster and Newsletter from time to time. They attend National and Chapter dinners and activities, and participate in "on the air" round tables on all bands with all modes of communications.

Yearly QSO parties are held for all QCWA members to take part in, with a prize for high score entrants. Many Chapters hold picnics and other noteworthy activities to give their members that "glad to belong feeling."

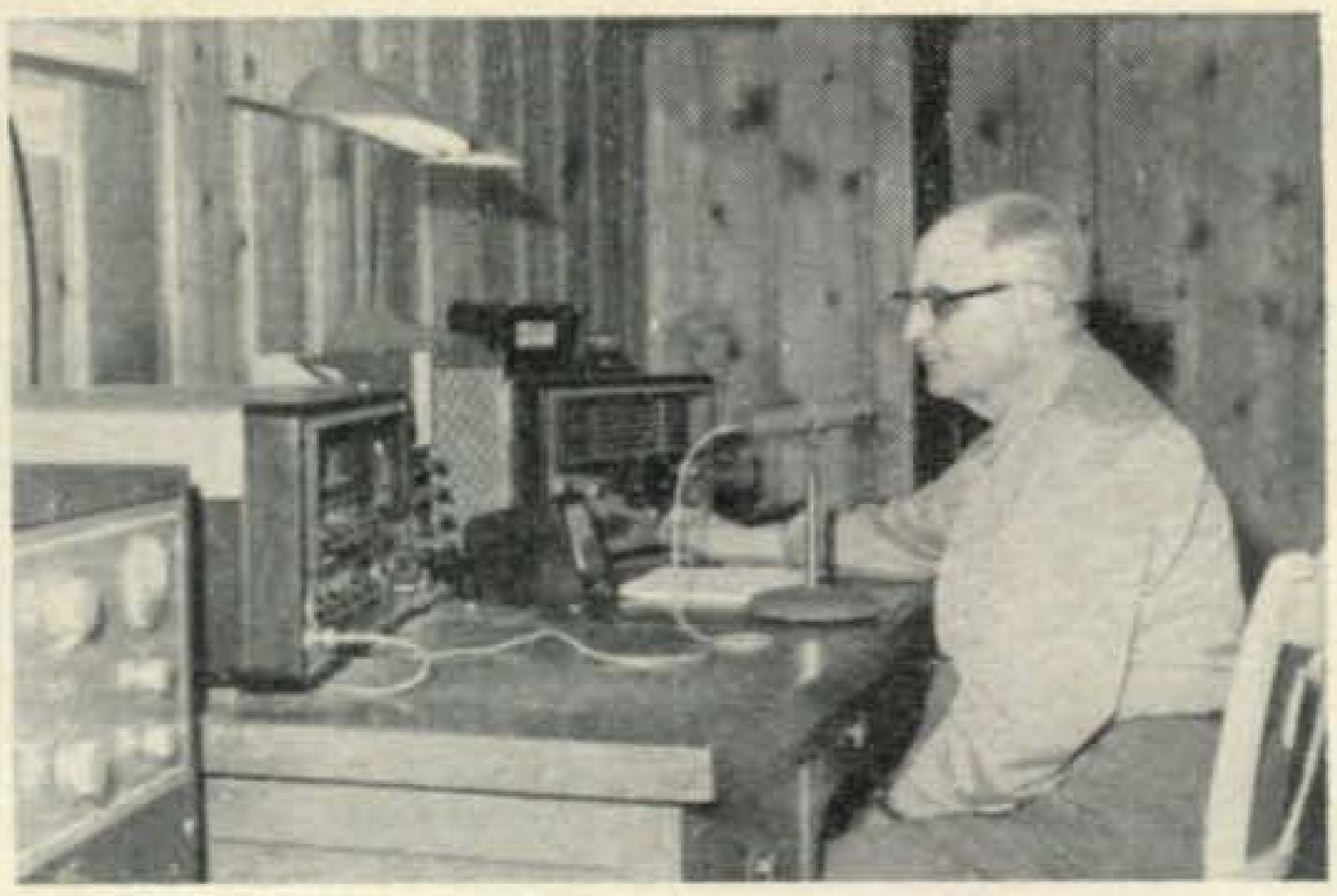
Requirements For Membership

Requirements for membership in the Quarter Century Wireless Association are: Applicant must have held a Federal or Government Amateur License at least 25 or more years ago, and must (at time of applying) hold a valid one. Proof of eligibility must be shown.

Dues are as follows: $5.00 in advance for three years, or $10.00 in advance for six years, or $25.00 for Life Membership, if approved by the Board of Directors. Each applicant must also pay an entry fee of $3.00 with his first dues payment. A gold-plated pin or button with call sign engraved costs $2.50, and takes up to ten weeks for delivery. An application blank may be had from A. J. Gironda, Executive Secretary, 1417 Stony Brook Avenue, Mamaroneck, N. Y. (10543).

At the Golden Anniversary Celebration of Amateur Radio Licensing banquet, held in New York City in October 1962, it was a pleasant surprise to see that more than sixty percent of the award recipients were members of the QCWA. It was also very gratifying to know that almost all of the members of the committee who made possible the Golden Anniversary celebration of radio licensing, while they were representing other sponsoring societies, were QCWA members.

The Quarter Century Wireless Association is so well thought of that the Radio Society of Great Britain has started a similar organization.



John, W2FX, at the operating desk.

At this writing we have processed 5500 applications over 4000 of whom are paid up members in good standing. We have issued about 200 Fifty-Year Awards. Our Life Membership is well over 500 and growing steadily.

Right after World War II, there was a large influx of radio Amateurs and many of these will shortly be eligible for Membership in The Quarter Century Wireless Association. We expect that during the next ten years that our membership will double and plans are now being made to take care of this increase.

The QCWA will celebrate its Twentieth Anniversary by a banquet which will be held in New York City late in October. Notice of actual date and place will be published in the amateur radio magazines. Any information desired may be had from W2MM, W2FX, W2AMB, and W2JE.

QCWA Members may be found around the following frequencies plus or minus 5 Kcs.

C.W.: 3540, 3655, 3790, 7005, 7035, 7115, 21,100 and 28,110 kc.

A.M.: 3810, 3950, 7240, 14,240, 21,340, 28,500 and 50,200 kc.

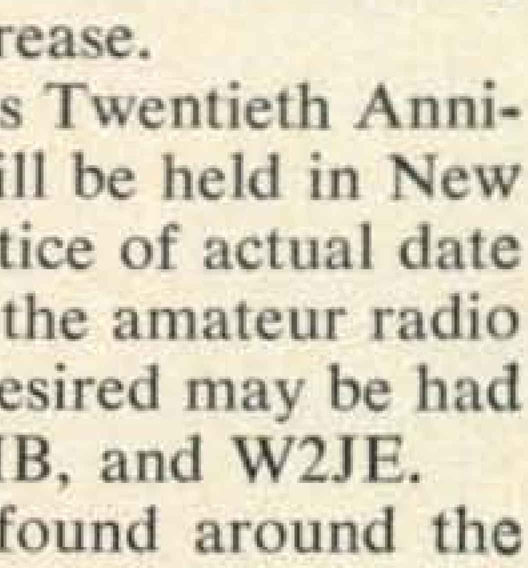
S.S.B./L.S.B.: 3804, 3950, 3999, 7204 and 7299 kc.

S.S.B./U.S.B.: 14,335, 21,350, 21,410, 21,440, 28,960 and 50,210 kc.

RTTY: 7105, 14,140, 21,150 and 28,280 kc.

New Amateur Product

Sydmur



The Sydmur Electronic Specialties Company announces the availability of the Sydmur Transistorized Capacitor Discharge Ignition System. The Sydmur system uses the automobile's original equipment, and guarantees to improve engine performance, and sharply reduce ignition noise. It is available for 12 volt neg. ground operation. It sells for $34.75, and in kit form for $24.95. For further details write to: Sydmur, Dept. 25H, Midwood Station, Brooklyn, New York, 11230, or circle 64 on page 110.

Results of the

27th YLRL Anniversary Party

BY LOUISA B. SANDO,* W5RZJ

CONGRATULATIONS to the winners of the 27th Anniversary Party sponsored by the Young Ladies Radio League—a real VE landslide! The c.w. section (Oct. 19-20) was won by VE3BII, Jeanine Burgess, for the third straight year. Jan also placed second high in the phone section (Nov. 2-3), and captured the Corcoran Award for the highest *combined* c.w.-phone score. To top her honors Jan also won the W4HLF award, which Arlie makes for the highest combined score earned by a DX YL in North and Central America.

Highest score on phone was earned by VE3EZI, Ivy Smythe, and note how close her combined score is to Jan's for the Corcoran Award. Looks like these two Canadian YLs had their own private contest going!

Here are the top scores:

C.W.

1st—VE3BII, Jeanine Burgess	2,593
2nd—VE3EZI, Ivy Smythe	2,015
3rd—WA8EKQ, Beulah Shelly	1,450

Phone

1st—VE3EZI, Ivy Smythe	10,220
2nd—VE3BII, Jeanine Burgess	9,655
3rd—K4RNS, Marge Campbell	9,180

Combined C.W.-Phone

1st—VE3BII, Jeanine Burgess	12,248
2nd—VE3EZI, Ivy Smythe	12,235
3rd—WA4HOM, Brenda Garlough	7,384

Space precludes listing all of the scores, but here are the top ones for district and country:

VE3EZI, Ivy Smythe, earned high score on phone and second high on c.w. in YLRL's 27th Anniversary Party.

District & Country Leaders

C.W.

K1UOR	1,134	WA0EXX	1,120
K2CEP	1,188	VE1AQI	1,189
W3UTR	9	VE3BII	2,593
W9GHO/4	1,250	VE7ADR	1,125
K5LUZ	853	OH2YL	60
K6QPG	1,181	SP6AZY	50
WA8EKQ	1,450	UA3KBO	35
W9MLE	1,378		

Phone

K1UOR	5,580	KL7FQQ	263
WA2GPT	4,738	KP4CL	2,920
W3MDJ	4,464	KZ5TT	1,400
K4RNS	9,180	VE1AQI	2,257
K5OPT	5,763	VE3EZI	10,220
K6KCI	8,869	VE7NW	3,344
K7MRX	6,630	DJ2YL	2,900
WA8ARJ	6,698	OH5SM	45
WA9MIR	5,733	PY2SO	1,664
K0EPE	6,820	ZS6GH	1,980

Jan, VE3BII, who copped the majority of the awards in YLRL's 27th A.P., was written up in the April '66 issue of *CQ*, p. 96. Since that time Jan has received a bronze medallion to her BPL, but adds she took a holiday from traffic during the summer as her three vegetable gardens (organic) kept her hopping until late fall. Jan has recently been appointed to the Executive Council of YL Int'l SSB'ers and writes the Canadian column for *SSB'ers Voice*. Jan also recently joined a community choral and drama society. Jan's OM is Gord, VE3CRI, and they have two jr. YLs.

Both Jan and Ivy Smythe, VE3EZI, belong to the Ontario Trilliums (TOT), Jan having served as president since the club was formed, and Ivy serving as secretary. Ivy also is a member of YL Int'l SSB'ers and belongs to the Scarborough ARC, the York VHF Society and Radio Society of Ontario. Ivy was winner of YLRL's Howdy Days 1966 contest and earned top Canadian c.w. score in the YL/OM contests in '66, '65, '64 and '62. She is the only YL to even win the Ontario 2-meter Low Power Trophy (in conjunction with ARRL's v.h.f. contests). She holds WAC, WAS, YLCC, DXYL, CP25, OPS, RCC.

Ivy's OM is Cliff, VE3EZC, and they both got amateur tickets in 1961 and Advanced class in 1962. Cliff is well known on v.h.f. with 15 states on 144 and 5 on 432. Prior to last March Ivy went out to business and her operating was limited to c.w., but since then she has been having fun on s.s.b. with an HT-44 and SX-117.

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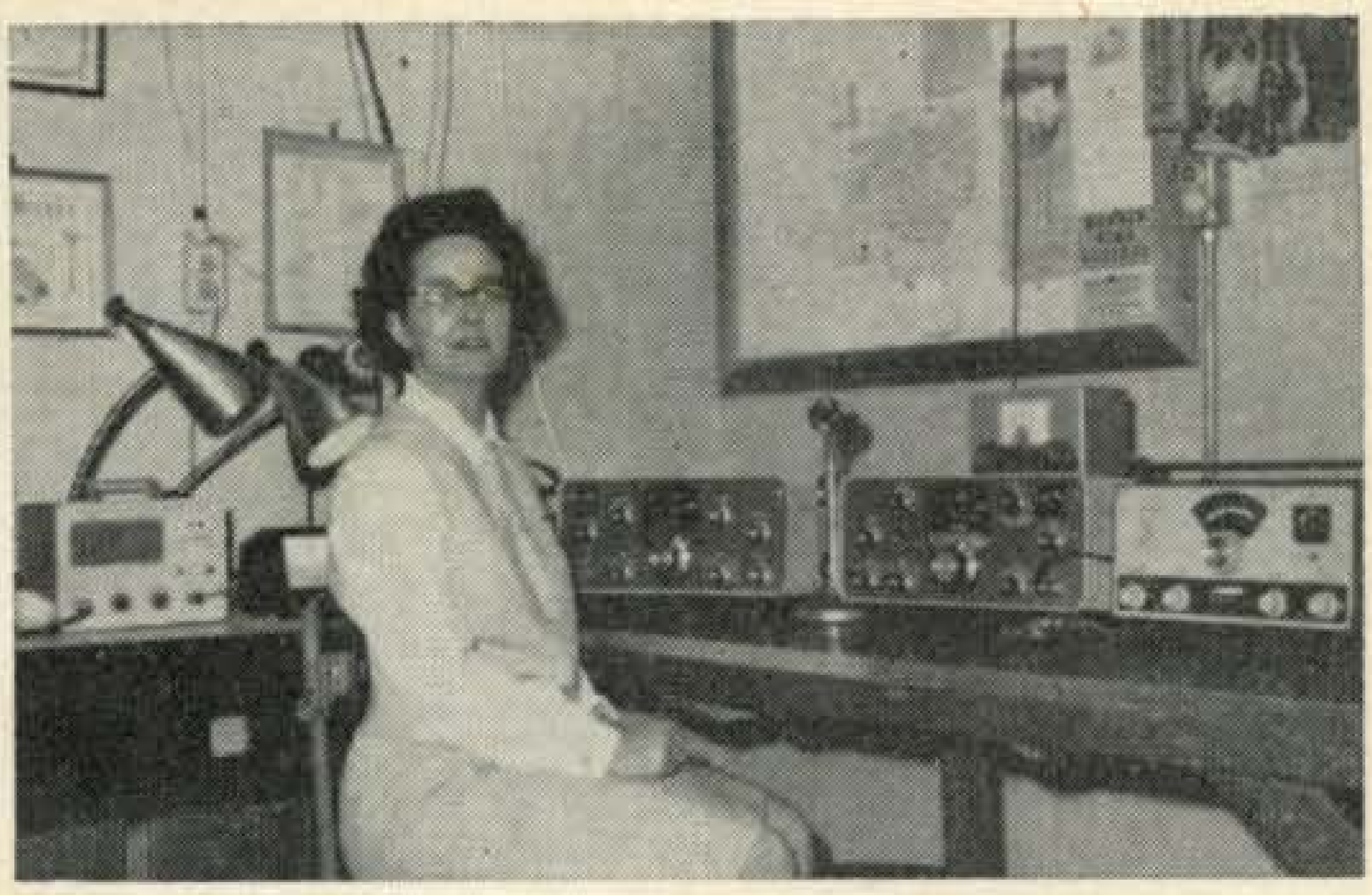
*4417 Eleventh St., N.W., Albuquerque, New Mexico, 87107.

K4RNS, Marge Campbell, who scored third high in the phone section of the A.P., and second high in '65, has been written up in these pages earlier. Marge is proud of son Mike who is on the *Wasp* and has taken part in all the splashdown recoveries of the astronauts.

Beulah Shelly, WA8EKQ, entering a YLRL A.P. for the first time came up with third high score in the c.w. section, much to her surprise, she adds, as she found conditions rather bad. Beulah prefers c.w. and spends 95% of her time on this mode, ragchewing or hunting DX on twenty. She also teaches code to others wanting to obtain ham licenses and has helped with many school programs teaching children about ham radio. Beulah got her Novice license in June of '62 and her General a year later with the help of her OM, Emmett, K8AZU. She also enjoys building kits and put together her Heathkit SB-401. Other hobbies are sewing and handcrafts, restoring antique autos and stock car racing—almost more hobbies than she has time for since Beulah and Emmett have four jr. ops, girls 7, 10 and 13, and a boy 5.



WA8EKQ, Beulah Shelly, 3rd high scorer on c.w. in YLRL's A.P., shown with her '66 Christmas gift station: SB-300, SB-401, HW-12 and Sixer. Antennas are Hornet tribander, dipole and inverted V. Beulah enjoys building and put together the Heathkit SB-401.

73, Louisa, W5RZJ.

Le Chatelier and the C.B.ers

BY E. M. WAGNER,* G3BID

Le Chateliers theorem says in effect that "a system in equilibrium if subjected to constraint will so adjust itself as to minimize the effect of this constraint."

This is a fundamental law of nature which is basically true in all circumstances. It is even to a large extent true when the system is not in perfect equilibrium.

What has all this to do with C.B.ers? A lot!

To become a radio amateur in America or Britain or most other countries, it is necessary to pass an exam and a code test.

This is a constraint and when the Citizens Band was thrown open without the necessity of any form of examination or code test, an easy way was found for the system to adjust itself to minimize the effect of this constraint. Many people who might have become radio amateurs but who were either unable or unwilling to do the examination or code test, became C.B.ers, thereby minimizing the effect of the constraint.

However, the constraint was small and the disadvantages and restrictions placed upon C.B. operation were considerable so that the tendency to minimize this small constraint was not initially very great.

Then the discussion ranged far and wide on incentive licensing; it was proposed to create extra and more advanced classes of radio amateurs which status could be achieved by additional and more advanced examinations and/or tests. This was introduced deliberately with a view to raising the standard of qualifications of the American Radio Amateur. It was argued that this would assist in the defence of the Amateur bands at any future Frequency Conference by impressing the emergent or less developed countries. This is a very doubtful argument since most of the less developed and emergent countries feel that any raising of the standards in the developed countries is merely the white man's way of keeping the coloured man out, by raising the standards above what most of the inhabitants of the less developed countries can achieve.

This will probably, therefore, have the reverse effect, namely, of antagonising the emergent countries rather than impressing them favorably. This is, however, by the way and is irrelevant to our discussion on the Le Chatelier and the C.B.ers.

The creation of these additional and higher categories of radio amateurs did not in itself

[*Continued on page 97*]

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*5 Ferncroft Ave., London N.W.3., England.

DX

BY JOHN A. ATTAWAY,* K4IIF

Contest Coming Up

REMEMBER the *CQ* Worldwide SSB DX Contest coming up April 8 & 9. To add a little spice for those of you who are more interested in working prefixes than making a big contest score we are adding a new twist. As mentioned in the March issue, a special WPX certificate will be offered to any single operator station working 200 prefixes in the contest; a deluxe certificate and a 1 year subscription to *CQ* will go to any single operator station who works over 300 prefixes, and a plaque and a 5 year subscription goes to any single or multi-operator station working 400 prefixes. Last year's top prefix count was 4U1ITU with 312.

The standard WPX rules will be followed for these certificates. A typewritten or printed list of stations worked arranged in alphabetical order by prefix should be submitted. Be sure to QSL your contacts in case question arises concerning confirmation of any unusual or unexpected prefixes.

Acknowledgements

A monthly DX column would be very difficult without the help of the editors of the weekly and bimonthly DX bulletins who send us their news-sheets. Among those to whom we owe a debt of gratitude for this issue are: *The DXers Magazine,* Gus Browning, W4BPD, Editor; *The DX News-Sheet,* Geoff Watts, Editor; *The West Gulf DX Club Bulletin,* Frank Campbell, W5IGJ, Editor; *The Northeast DX Association Bulletin,* Herb Kline, K1IMP, Editor; *The Puerto Rican DXer,* Jose Toro, KP4RK, Editor; *The Long Island DX Association Bulletin,* Bill Lipsky, WA2EFN, Editor; *DX-MB,* Walter Geyrshater, DL3RK, Editor; and the *Florida DX Club DX-Report,* Jesse Morris, W4MVB, Editor. Many Tnx fellows!!

Dick, W4ETO and Ernie, K4RLO at the 10 and 20 meter operating positions of W4ETO during the first weekend of the ARRL Fone DX Contest. Operating all bands 10-160 meters, the multi-op crew consisting of W4ETO, K4RLO, WA4PXP, WA4WIP, WA4LUG, K4GRD, K4IIF, and W0LNE made over 1,000,000 points during the first weekend of the contest. Full kilowatts were used on all bands except 160 meters. You should have seen Dick jump for the big linear when the flash bulb went off unexpectedly. (Photo by K4IIF)

DE EXTRA

The Controversial W9GIL Survey—In last week's mail we received the results of a survey conducted last November by John Scarvaci, W9GIL. Mr. Scarvaci circulated a questionnaire to members of the ARRL DXCC Honor Roll residing in all U.S. call areas. The purpose of this questionnaire was to uncover alleged irregularities in the operation of the Indian Ocean DXpeditions conducted by Don Miller, W9WNV, under the auspices of the World Radio Propogation Study Association (WRPSA). These alleged irregularities involve the failure of Mr. Miller to QSO certain prominent stations with good antennas and adequate power who apparently spent many hours attempting to make a contact.

From his own experiences and from the results of his survey Mr. Scarvaci feels that Don Miller and the WRPSA have not conducted themselves in the "Public Interest, Convenience, or Necessity, and also have been in violation of the 'Pecuniary Interest' section of the FCC regulations governing the amateur service." He further believes that their operations may "irreparably damage the foreign image of the American radio amateur." He asks that the ARRL take action to have the charter of the WRPSA revoked and the operator licenses of W4ECI and W9WNV revoked or suspended.

It is questionable whether the League has the authority to do what Mr. Scarvaci asks assuming it wishes to do so. However, this is not the major issue. What should concern us is whether or not the major series of DXpeditions conducted by Don Miller over the past 2 years have been in the best interest of amateur radio, and whether or not they have damaged the foreign image of the American amateur. Letters from overseas readers on the latter point would be appreciated. Naturally there will be much pro and con on such a controversial issue.

A statistician might feel that the W9GIL questionnaire was tailor made to produce the desired evidence. However, DE EXTRA is not a statistician so draw your own conclusions. The following series of questions were posed: (1) Did you receive a request (for funds) from WRPSA during Sept., 1966? (2) Did you contribute at that time? (3) Did you contact VQ9BC/D (Not a WRPSA DXpedition)? (4) Did you contact VQ9AA/D (W9WNV)? (5)

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*P.O. Box 205, Winterhaven, Fla., 33881.

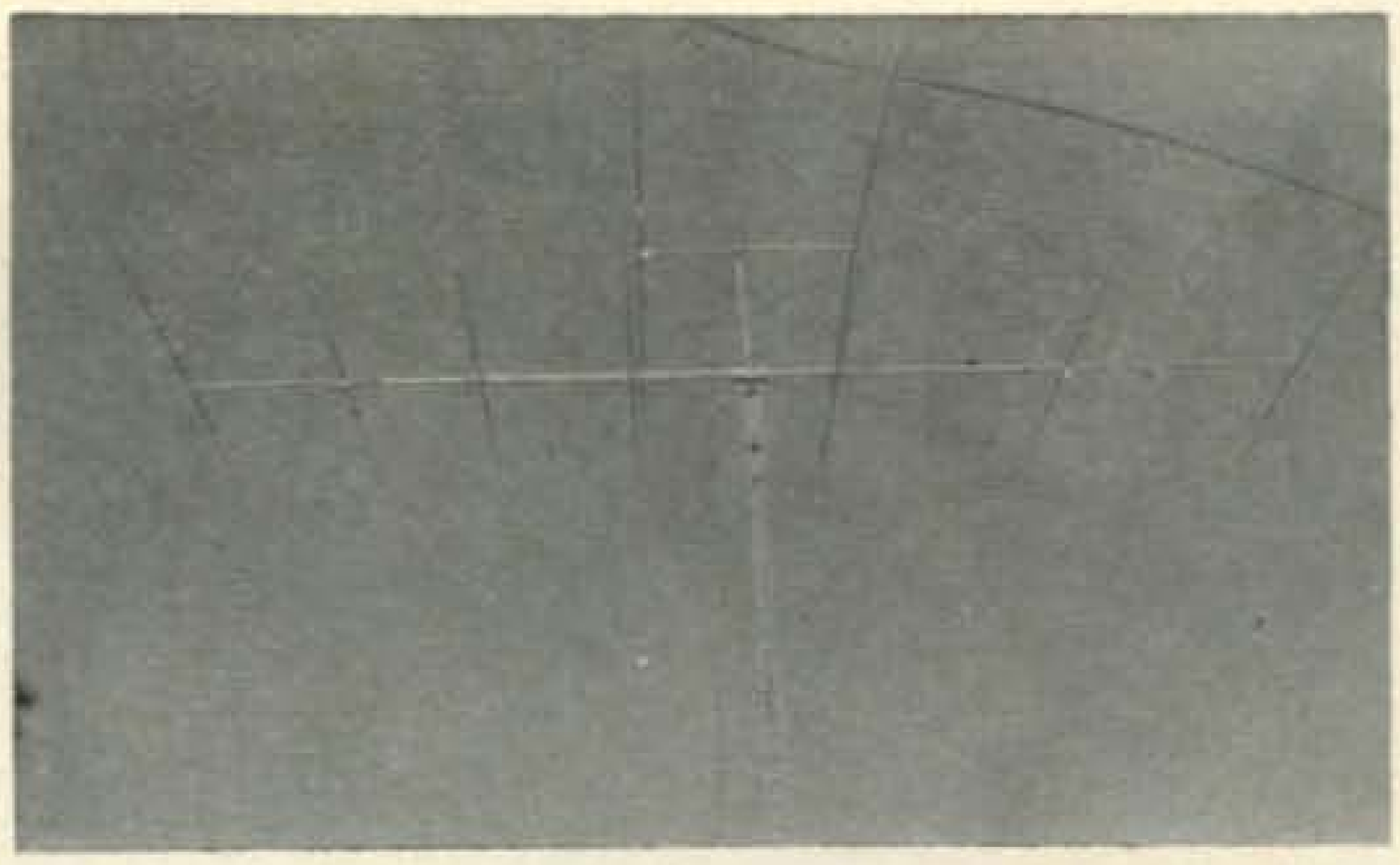
Did you contact VQ9AA/F (W9WNV)? (6) If the answer to 5 was no, how much time was spent calling that station? (7) Do you approve of DXpeditions? (8) If no, would you approve if conducted by nationals of the country issuing the license? and (9) Do you think that the WRPSA or other organizations of its kind *are in a position* to control the listings in the ARRL DXCC Honor Roll?

There were 110 replies to 185 survey sheets mailed. Not all 110 answered every one of the questions. The results by question were as follows: (1) 100 of 107 reported that they were asked for a donation. (2) 18 of 105 sent a donation. (3) 87 of 95 contacted VQ9BC/D operated by the boys from VQ9 land. (4) 81 of 90 contacted VQ9AA/D operated by W9WNV. (5) 55 of 103 contacted VQ9AA/F also operated by W9WNV. (6) As many as 50 hours were spent calling VQ9AA/F over a 4 day period by one Honor Roll member. (7) 76 of 90 approved of DXpeditions. (8) 17 of 21 approved of DXpeditions by nationals of the licensing country. (9) 73 of 99 felt that organizations such as the WRPSA could control the Honor Roll listings if they desired to do so.

There were many comments appended to the questionnaires ranging from "someone is making a fortune and having a ball" to "no trouble with Don anywhere, perhaps you need a good beam." A comment which got to the meat of the matter was "Don does not have the rare composure that Gus has—."

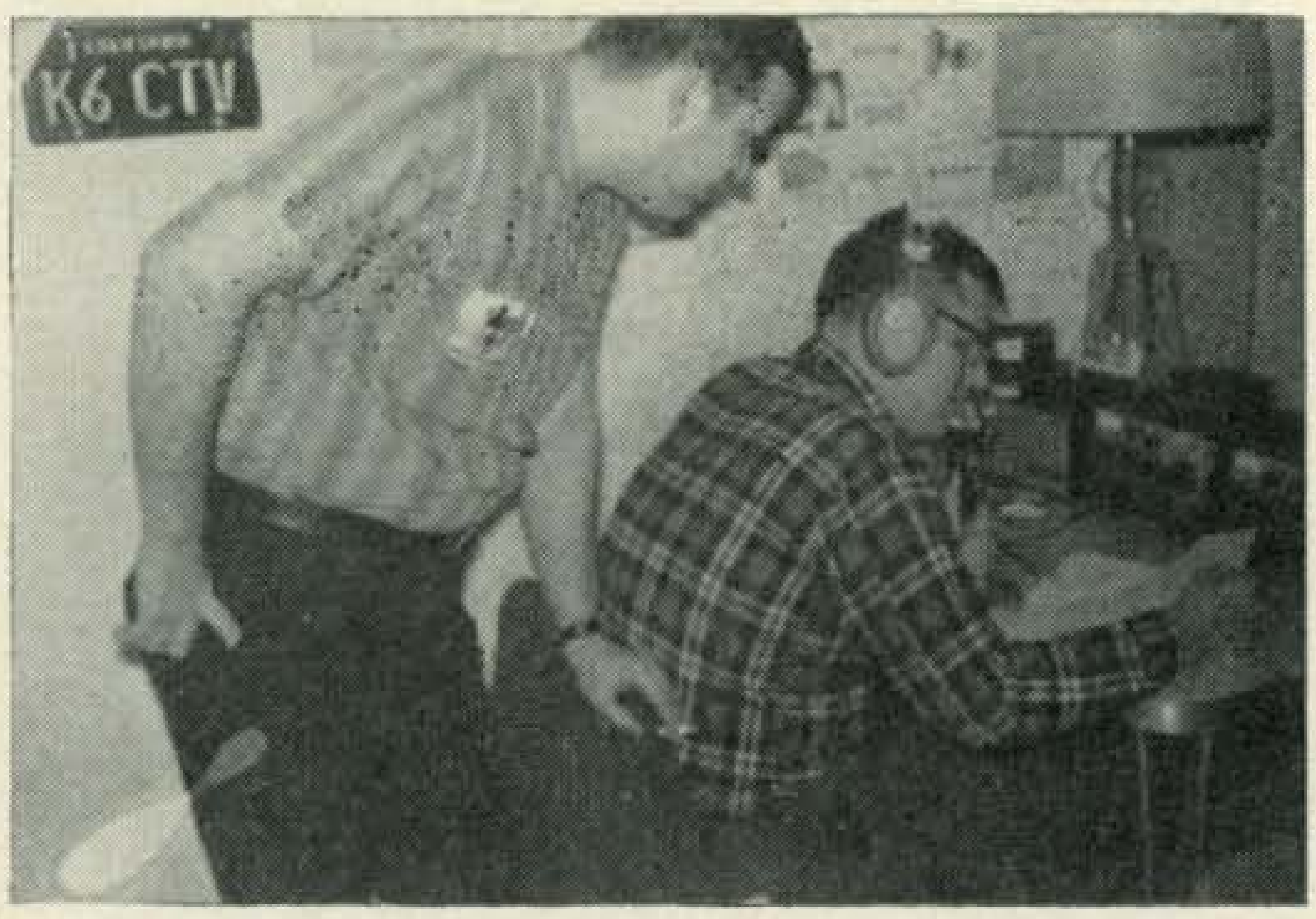
In DE EXTRA's opinion the situation looks like this: We have no evidence that Don's operations have hurt our image abroad. However, we are concerned by this allegation and we are anxious to receive the opinions of amateurs outside the USA. However, we do know from experience that you don't make any money on DXpeditions. Anyone who has made a simple trip to Europe or the Caribbean knows that you had better carry about twice as much money with you as you think you will need, and the places Don visits are infinitely more difficult and expensive to reach. Special transportation must usually be arranged because scheduled service is nonexistent. Don can't be entirely blamed for having a more open ear for those who make the trip possible. If he has to miss somebody its only human that he would prefer to miss someone who considered the DXpedition not sufficiently important to support it. Anyone who thinks Don is blackmailing them into supporting his trips should blame the system that makes it possible, not Don and WRPSA. They are only the symptoms. Advise your ARRL Division Director of your feelings and enlist his support to modify the DXCC rules to prevent the recognition of this type of operation in the future. DE EXTRA doesn't necessarily advocate this course of action, but it would be a logical form of protest.

Incidentally, anyone who thinks DXpeditions make money should ask Gus Browning. If DXpeditions made money Gus would be riding around in a Rolls-Royce limousine and living in the biggest mansion in South Carolina right next door to his own private Coca Cola bottling plant. Instead he is back at the old home place driving a Ford Mustang courtesy Stu Meyer and the DX fraternity. To top it off he has to beg money for the offset press at his new DX magazine. Anybody who is interested enough in DX to have read this column this far should support Gus's magazine with a subscription and a contribution to the press. Its a small thing to do for a man who has done so much for DX. Its a darn fine magazine anyway.



A portion of the antenna system used at W4ETO during the ARRL DX Contest. The monster is a 7 element 20 meter beam on an 81 foot boom mounted 75 feet above ground. Above it at the 85 foot level are 2 full size elements on 40 meters. In addition, the antenna system included a 5 element 15 meter beam at 60 feet, and a 4 element 10 meter beam at 45 feet. The latter beams were on separate individual towers. There were inverted Vees at 55 ft. for 80 and 160 meters. (Photo by K4IIF)

From this corner it looks like Don is in this not to make money, but because he likes to travel and to operate contest style. The fellow is a regular DX machine, and its paying for his travels, so maybe you could say that he is getting rich in experiences and be right. However, experiences don't buy shoes. The trouble then must originate in the fact that Don simply doesn't have Gus Browning's composure, coupled to the fact that we have a few operators loose in this country who would make most anyone lose his sanity to say nothing of his composure. Some of these characters seem to think that the 20 meter band is their private preserve, and they try to use high power and big antennas as game wardens. Don gets angry at some of these people for tailending, ignoring his instructions, or some other bad practice, and the resulting fallout may hit the innocent as well as the guilty. It shouldn't be that way but it is and anyone who wants to chase DX under the present system has to learn to live with it. For the record, I am not referring to W9GIL because I have not heard him engage in these practices and I therefore presume that he is among the innocent in this regard. He apparently didn't support Don financially and got left out when the limited number of QSOs were passed out. This is bad, but until the system is changed the only insurance is to either contribute or else adopt a "so what" attitude when you miss Don from a rare one.



Bob, K4GRD and Jimmy, WA4PXP at the 15 meter operating position of W4ETO during the first weekend of the 1967 ARRL DX Fone Sontest. (Photo by K4IIF)

In conclusion, DE EXTRA feels that small privately financed DXpeditions, dependent on no one for contributions, are the most desirable. A few guys going to a rare location once a year can have a real ball and it is 100% amateur. Different groups within the Florida DX Club have been doing this for many years with excellent results. However, Don has a majestic style. When he comes on there is excitement. There is nothing like the baying of the hounds on 14205 to let you know the fox is free and the chase is on. This style of operation will probably be around a while longer.

Attention All Novices

Announcing the WPNX Award, for novices only—Many of you are aware of our WPX Award for working 300 different prexies on c.w. or fone, 200 on s.s.b., and 400 mixed. As Novices using low power and only a small segment of the bands, working 300 prefixes is pretty rough if not impossible. Therefore, we are giving you a head start with a special WPNX Award for working 100 prefixes as a Novice. Additional endorsements will be available for working 150, 200, 250, etc. prefixes. In order to give everyone the same starting point in the race for certificate number one, contacts for this award must be made after May 15, 1967. This gives you guys and gals some time to talk it up on the bands so get busy. As you know not every Novice is a subscriber to *CQ*, though everyone should be, as there will be interesting things ahead. Incidentally, when you get your General ticket your WPNX prefixes can count toward your WPX.

To apply for the WPNX Award send a self-addressed stamped envelope to me, K4IIF, DX Editor *CQ* Magazine, P.O. Box 205, Winter Haven, Fla. 33881, and I will send you the proper application form. The forms may not be printed until after the race starts so it isn't necessary to apply immediately. The completed form should then be returned to me with the QSL cards for the 100 prefixes. The form should list the stations in alphabetical order by prefix, i.e.; CP1AB, DL3RK, DL4YB, F3CK, G2BVN, HK4EB, KN1XYZ, LU1DAB, OA4W, ON4GM, PA0LOU, TI2HP, WN2XYZ, WN3ABC, etc. Have your envelope postmarked clearly, as the application with the earliest postmark will receive WPNX No. one.

The Navassa Story

DE EXTRA hopes to have more information on the Navassa Island situation by next month. We have written to Herb Kline, K1IMP/KC4; Bob White, W1WPO, ARRL DXCC authority; and Ernie Hendry, K4CAH, of the Florida DX Club. We have already received a reply from Mr. White along with a copy of the letter from the Coast Guard upon which non-acceptance of the expedition is based. However, this letter is only for our use in determining our stand on allowing credit for this operation in the *CQ* award's program, and it won't be reproduced in this column.

WAE and EU-DX-D

Walter Geyrhalter, DL3RK, writes that he is the new manager for the WAE (Worked All Europe) Award, and EU-DX-D (European DX Diploma). All future applications should be sent to his address which is: Box 262, 895 Kaufbeuren, West Germany.

Most Wanted Countries

In the Feb. 8 issue of the *DXers Magazine* a listing is given of the 40 most needed countries as of a questionnaire circulated in late January. VU-Laccadives, VQ8—Chagos, and TI9—Cocos are probably already off this list as a result of recent activity there. By the time you read this others will have been removed as well at the rate things are moving. However the list makes interesting reading so here it is:

1. ZA—Albania
2. YI—Iraq
3. VQ8—Rodriguez
4. EA0—Spanish Guinea
5. FO8—Clipperton
6. HK0—Malpelo
7. VQ8—Chagos
8. TI9—Cocos
9. 3Y—Bouvet
10. VQ8—Agalega
11. EA9—Rio de Oro
12. VU—Laccadives
13. EA9—Ifni
14. CE0Z—Juan Fernandez
15. MP4Q—Qatar
16. TT8—Chad
17. VK9—Nauru
18. VP8—South Sandwich
19. VR1—Phoenix
20. 3V8—Tunisia
21. FR7—Tromelin
22. VK0—Heard
23. XU—Cambodia
24. AP—Pakistan
25. TZ—Mali
26. FO8M—Maria Teresa
27. 8Z4—Saudi/Iraq Neutral Zone
28. 8Z5—Saudi/Kuwait Neutral Zone
29. VR3—Fanning & Christmas
30. VR5—Tonga
31. TJ8—Cameroun
32. JY—Jordan
33. KH6—Kure
34. 1S—Spratly
35. VP8—South Georgia
36. 4W1—Yemen
37. VQ1—Zanzibar
38. TR8—Gabon
39. AC3—Sikkim
40. AC4—Tibet

Netherlands QSL Bureau

Lou van de Nadort, PA0LOU, longtime editor of *DX-Press* and one of Europe's foremost

[*Continued on page 98*]

Contest Calendar

BY FRANK ANZALONE,[*] W1WY

Calendar of Events

April 1-2	SP DX C.W. Contest
April 1-2	Florida QSO Party
April 8-9	**CQ WW SSB DX Contest**
April 22-23	Helvetia 22
April 29-30	PACC CW/Phone Contest
April 29-30	ONE LAND QSO Party
April 29-30	Missouri QSO Party
April 29-30	Ohio Intrastate Party
May 6-7	**CQ Spring VHF**
May 13-15	Georgia QSO Party
May 20-21	YL Int. SSBers Contest
June 2-5	CHC/FHC/HTH QSO Party
June 3-4	National Field Day
June 10-11	ARRL VHF Party
June 10-11	New York State QSO Party
June 25-26	ARRL Field Day
July 1-2	Venezuelan Contest
July 22-23	Colombian Contest
August 12-13	WAE C.W. DX Contest
September 9-10	WAE Phone DX Contest

SP DX C.W. Contest

Starts: 1500 GMT Saturday, April 1
Ends: 2400 GMT Sunday, April 2

Its the world working the SPs on c.w. only in this one. Besides contest awards, contacts may also be credited for other Polish awards. These awards are also available to s.w.l.s.

Rules are the same as last year and fully covered in last month's CALENDAR.

Your logs go to: The SP DX Club of the PZK, Contest Committee, P.O. Box 320, Warszawa 1, Poland. Mailing deadline is May 1st.

Florida QSO Party

Three time periods:
1500-2000 GMT Saturday, April 1
0000-0500 GMT Sunday, April 2
1400-2400 GMT Sunday, April 2

Rules are the conventional state party type with bonus points for working additional counties. See last month's CALENDAR.

Mailing deadline for logs is April 30th to: Florida Skip Contest Chairman W4WHK, P.O. Box 501, Miami Springs, Fla. 33166. Include a 5¢ stamp for copy of results.

CQ WW SSB DX

Starts: 0000 GMT Saturday, April 8
Ends: 2400 GMT Sunday, April 9

Complete rules can be found on page 64 of last month's issue.

Rules are the same as last year except for one change. The contest period has been extended to 48 hours, but only 30 hours can be used for contest scoring. There is an 18 hour compulsory rest period which can be taken in up to three periods. We hope this additional time will promote activity on the LF bands.

This is the *only* change being made A prefix is still to be credited only *once* in the contest. We feel that more extensive study is necessary before any additional changes are made. We still invite comments and suggestions.

Its a bit late for log form requests, but you can use WW log sheets or make up your own.

Mailing deadline is May 15, 1967 and your logs of course go to: CQ World Wide SSB Contest, 14 Vanderventer Ave., Port Washington, L.I., N.Y. 11050.

Helvetia 22

Starts: 1500 GMT Saturday, April 22
Ends: 1700 GMT Sunday, April 23

It is hoped the HB boys have finally come up with a permanent date and that conditions will be favorable for this popular contest.

Every effort will be made to activitate all 22 Cantons. Both the contest award and the H 22 certificate are very attractive and worth trying for.

Rules are same as they have been for the past years.

1. All bands are allowed, 1.8 thru 30 mc. c.w./c.w. and phone/phone.

2. Serial numbers are the usual five and six digits, RS/RST plus a progressive 3 figure contact number starting with 001. In addition, Swiss stations will send the abbreviation of their Can-

We try our darndest to get our awards to the winners in our contests. Here is "Musty" W2TP presenting the K2HLB Trophy to Sonia, PY2SO winner of the Single Band C.W. award in the 1965 contest. The occasion was a trip through South America by W2TP and W2BXA last summer.

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[*] 14 Sherwood Road, Stamford, Conn. 06905.

Sir Gus relaxing at OY2GHK, one of the stops in his safri around Europe. He did not have this luxury in all his scores of DX stops. The one down in Bouvet Island, in the South Atlantic for instance.

ton after their number. (ie: 579001/ZH)

Abbreviations of the 22 Cantons are: AG, AR, BE, BS, FR, GE, GL, GR, LU, NE, NW, SG, SH, SO, SZ, TG, TI, UR, VD, VS, ZG, ZH.

3. Each contact with a HB station counts 3 points and the same station can be worked once on each band, either on c.w. or phone.

4. The multiplier is the sum of Swiss Cantons worked on each band, a possible 22 per band.

5. Your final score therefore will be your total QSO points multiplied by the sum of Cantons.

6. Certificates will be awarded to the highest scorers in each country and each call district in the United States and Canada.

7. Use a separate sheet for each band and include a summary sheet showing the scoring and your name and address in BLOCK LETTERS. Also sign the usual declaration that rules and regulations have been observed.

8. Send your log within 30 days to: Marius Roschy, HB9SR, USKA Traffic Manager, Chemin Grenadiers 8, 1700 Fribourg, Switzerland.

PACC C.W./Phone

Starts: 1200 GMT Saturday, April 29
Ends: 1800 GMT Sunday, April 30

Its the world working the PA0 on both c.w. and phone which will be considered different contests and separate logs must be submitted.

Complete rules in last month's CALENDAR.

Mailing deadline is June 15th to: P.v.d. Berg, PA0VB, Contest Manager, Keizerstraat 54, Gouda, Netherlands.

ONE LAND QSO Party

Starts: 0000 GMT Saturday, April 29
Ends: 2400 GMT Sunday, April 30

A new one organized by the New England CHC Chapter, limited to 24 out of the 48 hour contest period and covered in last month's CALENDAR.

Mailing deadline June 15th to: N.E. Chapter 32, att: Carl Porter, 19 Penniman Terr., Braintree, Mass. 02184.

Missouri QSO Party

Starts: 2300 GMT Saturday, April 29
Ends: 0300 GMT Sunday, May 1

The fourth annual Missouri QSO Party was also covered in last month's CALENDAR.

Logs for this one go to: Bud Riegert, K0YIP, 1927 S. Compton, St. Louis, Missouri 63104.

Ohio Intrastate Party

Starts: 2300 GMT Saturday, April 29
Ends: 2300 GMT Sunday, April 30

Another one to add to the confusion on this already overcrowded week-end. As the title indicates this party is open to Ohio stations only.

The object of course is to work as many stations as possible in the 88 counties, however only ten stations per county may be counted. Multiply the number of contacts by the counties worked.

Submit your log to: Karla Hambel, K8HDO, 81 W. Main Street, Westerville, Ohio 43081 before May 30th.

CQ Spring VHF

Starts: 9:00 A.M. local time Saturday, May 6
Ends: 9:00 P.M. the same day

Full details will be found on page 36 of this issue.

Georgia QSO Party

Starts: 2300 GMT Saturday, May 13
Ends: 0500 GMT Monday, May 15

The sixth annual Georgia QSO Party is sponsored by the Columbus Amateur Radio Club.

There are no time or power restrictions and the same stations may be contacted both on c.w. and phone on each band.

Exchange: QSO number, RS/RST and QTH; county for Georgia stations; state, province or country for others. (Ga. to Ga. contacts permitted)

Scoring: Each completed contact counts 2 points. Ga. stations multiply their total QSO points by the sum of states, Canadian provinces and countries worked. Out of state stations will use Ga. counties for their multiplier. (Max. 159)

Freuencies: c.w.–1810, 3590, 7060, 14060, 21060, 28060. a.m.—3995, 7260, 14230, 21280, 28600. s.s.b.—3975, 7230, 14290, 21410, 28600. Novices—3718, 7175, 21110.

Awards: Certificates to the highest scoring station in each state, province, country and Georgia county. Second and third place awards where recognition is warranted. Plaques to the highest Georgia s.s.b. score and the highest Ga. overall score. The highest out of state score and the Georgia Club with the highest aggregate score will also receive plaques.

Include a signed declaration that all rules and regulations have been observed and mail your entry no later than June 15th to: Columbus ARC, Att: John T. Laney III, K4BAI, 3500 14th Ave., Columbus, Georgia 31904.

1966 — WAE - DX CONTEST RESULTS

C.W.

Continental Leaders

Europe	SM2BJI	147,803
North America	WB2CKS	54,840
South America	CP5EZ	58,719
Africa	CR6CK	52,768
Asia	4X4HF	122,784
Oceania	W0GTA/8F4	109,170

North America

USA

W1BPW	8,401
W1AGP	3,780
W1JYH	3,566
W1SWX	750
WB2CKS	54,840
W2MEL	49,265
W2PCJ	42,090
WA2UBC	18,278
W2ZKQ	3,808
W2IWP	3,069
W2NEP	2,200
W2GKZ	1,999
W2CKR	1,672
WB2CON	1,659
WB2HMS/2	882
WB2UOF	750
W2EMW	731
WB2PCF	720
W2KVL	290
WA2UDT	72
W2WZ	24
W3YUW	28,468
W3HQU	20,300
W3AJW	19,040
W3MCG	16,920
W3QQL	7,623
W3AXW	5,511
W3UVH	4,060
W3QLW	448
K4BAI	22,848
K4YFQ	10,291
W4HOS	9,246
W4OMW	8,736
W4KFC	3,294
W4YGO	972
WA4CZM	338
WA4YSG	80
W5WZQ	8,368
W5KC	7,840
W5OBS	870
W5LJT	820
W5ODJ	528
WA6SBO	17,738
WB6LFR	2,583
WB6KIL	234
K6PJT	72
WB6IEX	40
W7PQE	319
W8GQU	17,640
K8UDJ	12,672
W8VSK	7,600
W8GMK	615
W8DUS/8	504
W9IOP	48,793
WA9ISM	5,740
W9KXK	987
K9WMV	400
WA0KDI	3,920

Canada

VE2UN	5,656
VE2WA	5,056
VE3IR	1,975

Dominican Rep.

HI8XAL	4,800

Panama

HP1AC	198

Mexico

XE1KKV	752

Trinidad

9Y4VU	163

PHONE

Continental Leaders

Europe	DJ6QT	169,248
North America	HI8XAL	35,568
South America	CX9CO	24,656
Africa	5A2TR	92,421
Asia	OD5BZ	124,274
Oceania	W0GTA/8F4	59,215

North America

USA

W1HQV	1,207
WB2FON	17,526
WB2MDH	1,600
W2HES	936
W2WZ	555
W3CBF	9
WA4PXP	23,750
K4BAI	330
WA5ALB	994
K1KVN/7	35
WA8RSL	2,580
WA8DNT	1,560
W8HBR	832
W8LXU	304
WA9ISM	10,042
W9KXK	2,688
WA0KDI	1,854

Canada

VE2AFC	180
VE3BHS	8,787
VE6SF	1,314

Dominican Rep.

HI8XAL	35,568
HI8LC	77

Panama Rep.

HP1JC	504

Puerto Rico

KP4CL	11,137

Greenland

OX5AR	3,473

Grand Turks Islands

VP5RB	29,093

Guatemala

TG8CJ	1,564

Bold face denotes winner.

YL Int. SSBers Contest

Starts: 2300 GMT Friday, May 19
Ends: 0600 GMT Monday, May 22

This year's YL International SSB'ers contest promises to be a big one. There are many categories and a complicated scoring system. It is suggested that you write to WA6MWG for rules in details. If you wish to enter the DX/W-K team category you must also advise him.

Don't let the title SSB confuse you, many members are also c.w. operators and activity will be found in both modes.

Following are the rules in brief. There are three categories and you can enter more than one.

1. DX/W-K Teams: These teams will consist of a DX station and a stateside station. Each will enter the single operator section. Scores will be combined for team score.

2. YL/OM Teams: These teams will comprise of related pairs; husband/wife, father/daughter, mother/son, brother/sister. Operation must be from the same QTH and each will use their own call. Each partner scores separately, logs may also be submitted for single operator section.

3. Single operator: This is the only category open to non-members. Of course members may also enter this section.

Exchange: RS/RST, name, SSB number, State, VE province or country, zone and partner's call (if team member). Keep all times in GMT.

Scoring: Same for all categories. Contacts with SSB member 4 points, with non-member 2 points. C.W. contacts count double. (Non-members must contact SSB members only, contacts between non-members have no point value.)

Multiplier: Sum of different prefixes, countries, states, VE provinces, zones and teams. (Where both members have been contacted.) Note: KH6 and KL7 count both as state and DX country.

Frequencies: s.s.b.: 3810, 7215, 14332, 21373, 28673, (DX—3773, 7090, 14132) a.m.: 3825, 7250, 14240, 21340, 28800. (DX—3670, 7070) c.w.: 3565, 7020, 14080, 21080, 28080.

The same station may be worked on different bands and modes for additional QSO points.

[*Continued on page 96*]

the USA-CA PROGRAM

BY ED HOPPER,* W2GT

The "Story of The Month" is about John, K3WWP and The CW County Hunters Net.

On May 2, 1966 a CW County Hunters Net was started by K3WWP with the help of WA8EOH.

The manager of the net, John H. Shannon, K3WWP finally found time to send along a nice report on how well the net has been going. From May to the end of October 1966, over 4,000 stations checked into the CW County Hunter Nets from nearly all states and over 500 counties—many of them very rare counties. So if you could have gone without a lot of sleep, you could have easily earned USA-CA-500 on c.w. in that 6 month period, Hi.

Much good help has come from WA8EOH, WA9EZP, W4OWE, W5OIB, K1QFD, WA0JNF, W1ZLX, K3ZMI, K9RFU, WA8LAR, W3ZHQ, W3UVH, K9FZU. These stations, with K3WWP, have served and/or are serving as very capable NCS.

Credit must also go to the *many* mobiles who have helped with those rare counties. This list of mobiles includes W4YE, W2RSV, W4ITS, K8MYU, W8DUS, K9GDF, W9OVF, K1UZG and many others. An example of the help these fellows have furnished is the trip across Georgia by W4YE/M which produced 128 QSOs and with W4YE/M in Louisiana which produced 96 QSOs.

During this 6 month period there appears to have been a tremendous increase in county hunting activity, with many of the fellows regularly checking in with rekindled interest. Many of the hunters use 7035 as their hangout and a good county hunting rag chew can be had by calling CQ on this frequency, whenever CHN is not in session.

Another vote of thanks goes to the many stations who have made special trips to rare counties or have made sure to check into the CHN on their many trips early in the day before the big pileups start. These are too numerous to list but we must list Paul, W8CXS.

On November 21st, 3523 was added and it seems to be catching on fine, which is more than can be said for attempts to start a net on 14075.

COUNTY HUNTER NETS

1300-1700 GMT- 7225 s.s.b.
1800-2400 GMT-14336 s.s.b.
0100- GMT- 3947 s.s.b.

C.W.

Monday-Friday 1900-2200 GMT 7035 kc
Saturday 1530-2130 GMT 7035 kc
Sunday 1730-2130 GMT 7035 kc
Monday-Friday—eves. 0000-0300 GMT 3523 kc

John H. Shannon, K3WWP

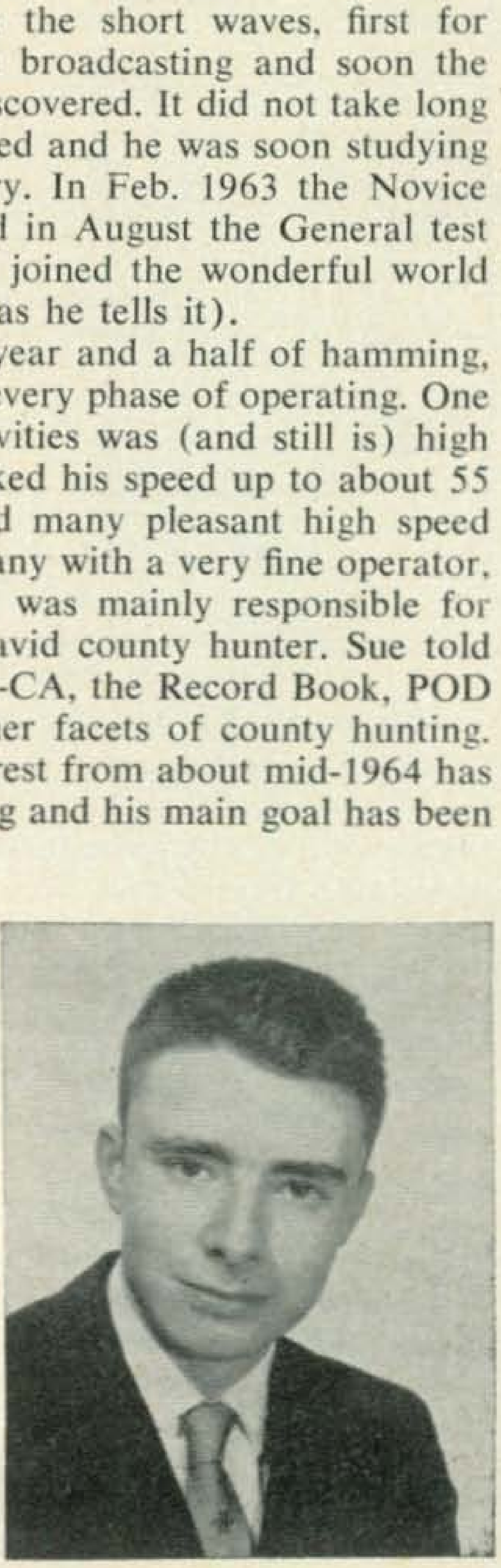
John H. Shannon, K3WWP, is 21 and a student at Gateway Technical Institute in Pittsburgh, an electronics school. He stays in Pittsburgh during the week and only gets home on weekends—which cuts down on his hamming.

Before ham radio, John had several other hobbies like collecting stamps and coins, with some coins dating as far back as 1796. But before radio and electronics, his main hobby was astronomy. At the age of 12, his homebuilt telescope (which included grinding the 10 inch mirror) won prizes at local and regional science fairs. He has maintained an interest in meteorology and has kept daily weather records of his QTH for 8 years. These records include maximum and minimum temperatures, precipitation, barometeric pressure and etc.

An interest in radio started about 5 years ago. He started broadcast band DXing and soon had the radio covering the short waves, first for regular short wave broadcasting and soon the ham bands were discovered. It did not take long for him to be hooked and he was soon studying the code and theory. In Feb. 1963 the Novice test was passed and in August the General test was passed and he joined the wonderful world of amateur radio (as he tells it).

During the first year and a half of hamming, he tried just about every phase of operating. One of his favorite activities was (and still is) high speed c.w. He worked his speed up to about 55 w.p.m. and enjoyed many pleasant high speed QSOs, including many with a very fine operator, Sue, W9KSE, who was mainly responsible for him becoming an avid county hunter. Sue told him all about USA-CA, the Record Book, POD 26, and all the other facets of county hunting.

John's main interest from about mid-1964 has been county hunting and his main goal has been



John H. Shannon,
K3WWP

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*103 Whitman St., Rochelle Park, N.J. 07662.

Canadian Centennial Certificate

The Royal City Amateur Radio Association

VE7FY

CANADA'S CENTENNIAL YEAR 1967

Congratulations!

Canadian Centennial Certificate

BALBOA AWARD

Balboa Award (KZ5)

Kamloops Amateur Radio Club

3C7 AWARD

Sportsman's Paradise

3C7 (Canadian) Award

Saskatoon Wheat Belt Award

this certifies that

saskatoon amateur radio club

Saskatoon Wheat Belt Award

to get as many counties as possible on 2 way c.w. with his 75 watts. His score is now 1360 worked and 1267 congrmed, with 7 state completed.

But he still enjoys all the other facets of hamming, from gear building to contests. Another one of his goals is to win first place nationally in a contest. He has won several times in Pennsylvania, but never better than 6th or 7th in the USA, but he is still trying.

John's station consists of a homebrew 75 watt transmitter, R-100 receiver, homebrew keyer, a dipole for 40 meters, long wire for 80 meters, and a full break-in system. So it is obvious that John has really done FB with his limited time, low power, and no beams. We old timers have to watch out for this new blood! HI.

Letters

"MID", W7ZC, writes: "Trying to catch you up on doings out this way. The Utah All-County Award you mentioned in *CQ* September 1965 is rather difficult and so far: #1 to W6KD, #2 to K9EAB, #3 to WA9AJF and #4 to WB6EOW. Still same rules, all 29 counties confirmed, GCR list to me and $1.00, Box 303, Springdale, Utah 84767. With all those mobiles it should get easier to obtain although WB6EOW only had a few mobiles, most were fixed stations.

Tom Spear, W5GK/7 now active at Zion National Park, Springdale, Utah 84767. We both operate c.w. and s.s.b.

Tom and I would gladly try to help *seriously* interested hunters with Washington County. Write, sending s.a.s.e., naming dates, times in GMT, and frequencies and giving three such possibilities and write 2 to 3 weeks ahead of schedule dates.

County hunters should not write to individuals to try to obtain lists of active stations in their area, write to ARRL SCMs.

K7SOT has available a Utah directory listing all Utah hams of recent date by towns, (not counties). Send $1.25 to Carroll F. Soper, K7SOT, 4422 Emigration Canyon, Salt Lake City 8, Utah. (He is State CD Radio Officer)."

Awards

Canadian Centennial Certificate: To honor Canada's Centennial Year 1967, the Royal City Amateur Radio Association, New Westminster, B.C. is sponsoring this award. It is available to any amateur in the world who submits proof of contact with 100 different amateurs in Canada, any band, any mode, during the Centennial Year, namely from January 1, 1967 to December 31, 1967. A copy of log information, verified by another amateur will be accepted as proof of contacts. All certificates will be sent free. Apply to: Royal City Amateur Radio Association Station VE7FY, 7386 East Grandview Douglas Highway, New Westminster, British Columbia, Canada.

Saskatoon Wheat Belt Award: To stimulate Canadian QSOs, the Saskatoon Amateur Radio Club is pleased to offer this award. Requirements: The following number of contacts with members of this club, which has about 90 members:

Manitoba, Alberta and Saskatchewan—need 15 contacts.
Rest of North America—need 10 contacts.
Africa, Australia and Europe—need 5 contacts.
Russia, Asia, etc.—need 3 contacts.

Send confirmed proof of logbook data or QSL cards plus 30¢ (or 3 IRCs) to Award Custodian, Henry J. Slack, VE5SM, R. R. 2, Saskatoon, Sask., Canada.

3C7 Award: The Kamloops Amateur Radio Club is going out for QSOs this year to help celebrate Canada's Birthday by issuing this 3C7 Award. Kamloops is a small center of the interior of British Columbia with a population of 25,000 and known as the Sunshine-Vacationland, with a small but eager group of hams. They are very active on a.m., s.s.b. and c.w. on all bands. To qualify for this award, stations should have QSOs with 7 British Columbia and 3 Kamloops stations, any band any mode after January 1, 1967. Cost 50¢, apply to Peter Cox, VE7BPG, 1413 Pine Crescent, Kamloops, B.C., Canada.

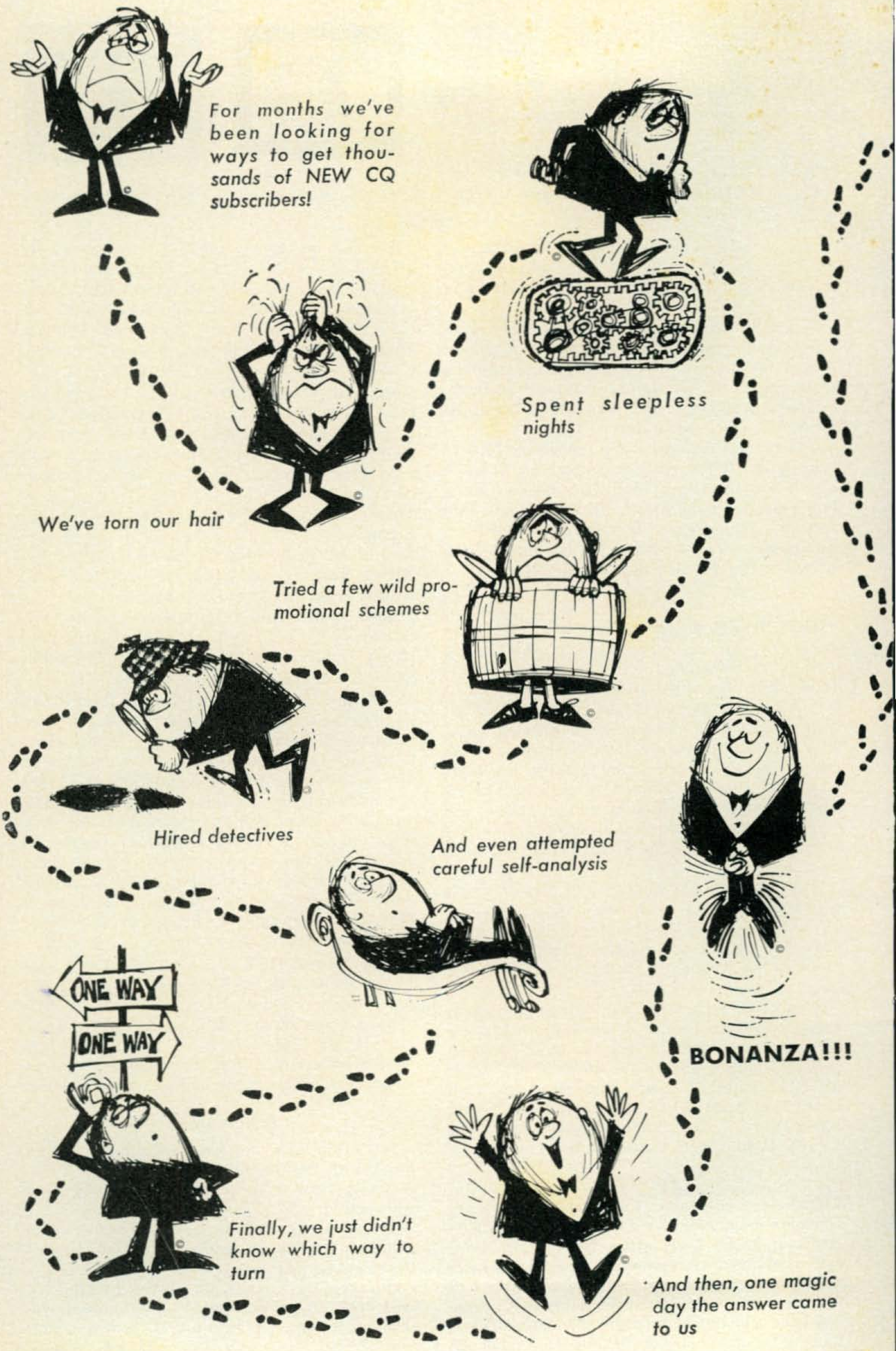
Balboa Award: Here is a new award that will be issued for working 5 members of the Canal Zone Amateur Radio Association, Box 407, Balboa, Canal Zone. Most of the active amateurs in the Balboa area are members of the club. Send certified (GCR) list and $1.00 to Awards Custodian, to full address as listed above.

Editors Notes

Sorry, but I do not have space to duplicate data on all the fine QSO parties, turn to CONTEST CALENDAR by Frank, W1WY for complete information.

I'm always happy to publicize worth-while awards, so try me by sending rules and copy of the award.

Our overseas friends are always looking for used POD 26 publications, let me know if you have one to send. CU next month, how was your month? 73, Ed., W2GT.



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Propagation

BY GEORGE JACOBS,* W3ASK

THE present sunspot cycle, rising slowly since its birth during October, 1964, took a great leap forward during the first month of the new year. The Zurich Observatory reports a monthly mean sunspot number of 108.5 for January, 1967. This is the highest level of solar activity observed since September, 1960, and is almost four times more intense than the level reported for the previous January.

The high level of solar activity observed during January results in a running smoothed sunspot number, upon which the solar cycle is based, of 51 centered on July, 1966. This month's *CQ* propagation predictions are based upon a smoothed sunspot number of 80, which is forecast for April, 1967.

With a more rapid increase in solar activity, 15 meters is expected to remain the best band for DX propagation conditions during the late morning and early afternoon hours. While the band is expected to open somewhat less frequently on east-west paths than it did during the winter months, excellent openings are forecast to almost all areas of the world from shortly after sunrise, through the early evening hours. On some circuits, 15 meters is expected to remain open well into the hours of darkness!

With increased solar activity and more hours of daylight, twenty meters is expected to remain open to one area of the world or another, practically around-the-clock. DX conditions will be optimum during the sunrise period, and again during the late afternoon and early evening hours, when excellent openings are forecast to most areas of the world. Exceptionally high signal levels are expected during many of the 20 meter openings forecast for April.

A seasonal decrease is expected in DX conditions on 10 meters. On the average, fewer openings will occur on this band during April as compared to the winter months. Some excellent openings, however, are forecast during the daylight hours, especially to tropical and southern areas.

During the late evening and early morning hours, 40 meters will probably be the best band for DX propagation conditions, although it may be a close race between 40 and 20 meters for this honor. Fairly good openings are predicted to many areas of the world during the hours of darkness and the sunrise and sunset periods. Some 80 meter DX openings may also be pos-

LAST MINUTE FORECAST

Day-to-Day Conditions and Quality for April

Days	*Forecast Rating & Quality* (4)	(3)	(2)	(1)
Above Normal: **7-8, 14, 16, 21**	A	A-B	B-C	C
Normal: **1, 4-6, 9, 11-13, 15, 17, 19-20, 22-23, 27-28**	A-B	B-C	C-D	D-E
Below Normal: **2-3, 10, 18, 24, 26, 29-30**	C	C-D	D	E
Disturbed: **25**	D	D-E	E	E

HOW TO USE THESE CHARTS

The following is an explanation of the symbols shown above and instructions for the use of the *CQ* propagation predictions:

1—Enter Propagation Charts on following pages under appropriate band and distance or geographical area columns. Read predicted times of band openings at intersection of both columns.

2—Following each predicted time of band opening is a forecast rating which indicates the relative number of days the band is expected to open during each month of the forecast period. The higher the rating, the more frequent the opening, as follows: (4) band open more than 22 days each month; (3) between 14 and 22 days; (2) between 8 and 13 days; (1) less than 7 days.

3—With the forecast rating noted above, start with the numbers in parentheses at the top of the "Last Minute Forecast" appearing above. Read down the table for a day-to-day forecast of propagation conditions in terms of Above Normal (WWV rating higher than 6); Normal (WWV rating 5-6); Below Normal (WWV rating 4); Disturbed (WWV rating less than 4). The letter symbols (A-E) describe reception conditions (signal quality, noise and fading levels) expected for each day of the month and have the following meanings: A—excellent opening with strong, steady signals; B—good opening, moderately strong signals, little fading and noise; C—fair opening, signals fluctuating between moderately strong and weak; D—poor opening, signals generally weak with considerable fading and noise; E—poor opening, or none at all.

4—This month's DX Propagation Charts are based upon a transmitter power of 250 watts c.w.; 500 watts s.s.b., or 1000 watts d.s.b. into a dipole antenna a quarter-wave above ground on 160 and 80 meters, a half-wave above ground on 40 and 20 meters, and a wave-length above ground on 15 and 10 meters. For each 10 db gain above these reference levels, reception quality shown in the "Last Minute Forecast" will improve by one level; for each 10 db loss, reception will become poorer by one level.

5—Local Standard Time for these predictions is based on the 24-hour system.

6—The Eastern USA chart can be used in the 1, 2, 3, 4, 8, KP4, KG4 and KV4 amateur call areas; The Central USA Chart in the 5, 9 and 0 areas, and the Western USA Chart in the 6 and 7 areas. The Charts are valid through May 31, 1967, and are prepared from basic propagation data published monthly by the Institute For Telecommunication Sciences And Aeronomy of the U.S. Dept. of Commerce, Boulder, Colorado.

FLASH

Karl Meinzer, DJ4ZC reports that the OSCAR-EUROPA satellite has been completed and has passed all of the tests given to it in Europe. The satellite was shipped to Project OSCAR headquarters in California during early March, where it will undergo final tests in preparation for a launch which may take place during the late spring or early summer. More in next month's CQ. *—W3ASK* sible during the hours of darkness, but there is little chance for more than an occasional DX opening on 160 meters during this same period.

---

*11307 Clara Street, Silver Spring, Md. 20902.

Static levels are expected to increase considerably during April, especially on the 40, 80 and 160 meter bands.

DX propagation predictions for each of the amateur bands from 10 through 160 meters appear in the Charts on the following pages. For predictions of short-skip openings, between 50 and 2400 miles, refer to the *Short-Skip Propagation Charts,* which appeared in last month's column.

V.h.f. Ionospheric Openings

There's a good chance for some 6 meter trans-equatorial scatter openings to take place during April. The optimum time for these openings are the early evening hours, and the optimum direction is due south, towards Latin America.

There's also a good chance for some v.h.f. meteor-scatter openings to take place between April 19 and 23, when the *Lyrids* meteor shower is expected.

A seasonal increase in sporadic-E propagation begins during April, and this is expected to result in an increase in the number of short-skip openings on 10 and 6 meters. Sporadic-E openings on these bands generally take place over distances ranging between 750 and 1300 miles, although openings over greater distances are sometimes also possible. While sporadic-E openings may occur at any time of the day or night, there is a tendency for them to peak between 8 A.M. and noon and again between 5 and 8 P.M., local standard time.

V.h.f. auroral-type ionospheric openings are likely to occur during April when the ionosphere is disturbed. Check the "Last Minute Forecast" at the beginning of this column for the dates which are expected to be either "below normal" or "disturbed."

CQ DX PROPAGATION CHARTS

APRIL AND MAY, 1967

Time Zone: EST (24-Hour Time)
EASTERN USA TO:

	10 Meters	*15 Meters*	*20 Meters*	*40/80 Meters*
Western & Central Europe & North Africa	11-17 (1)	08-11 (1) 11-14 (2) 14-16 (3) 16-18 (2) 18-20 (1)	05-08 (3) 08-12 (2) 12-15 (3) 15-19 (4) 19-20 (3) 20-22 (2) 22-05 (1)	18-20 (1) 20-21 (2) 21-23 (3) 23-01 (2) 01-03 (1) 20-22 (1)* 22-23 (2)* 23-01 (1)*
Northern Europe & European USSR	*Nil*	09-11 (1) 11-15 (2) 15-17 (1)	03-07 (1) 07-09 (3) 09-14 (2) 14-16 (3) 16-17 (2) 17-20 (1) 20-23 (2) 23-00 (1)	19-00 (1) 20-23 (1)*
Eastern Mediterranean	*Nil*	10-13 (1) 13-16 (2) 16-18 (1)	04-07 (1) 07-09 (2) 09-14 (1) 14-20 (2) 20-22 (3) 22-00 (2) 00-01 (1)	19-21 (1) 21-23 (2) 23-00 (1) 21-23 (1)*
East Africa	13-17 (1)	07-10 (1) 10-14 (2) 14-16 (3) 16-18 (2) 18-19 (1)	07-09 (2) 09-14 (1) 14-18 (2) 18-21 (3) 21-23 (1) 23-01 (2) 01-07 (1)	20-00 (1) 21-23 (1)*
West & Central Africa	11-17 (1)	07-11 (1) 11-13 (2) 13-15 (3) 15-17 (4) 17-18 (2) 18-19 (1)	05-09 (2) 09-13 (1) 13-15 (2) 15-17 (3) 17-19 (4) 19-21 (3) 21-22 (2) 22-05 (1)	19-21 (1) 21-01 (2) 01-02 (1) 22-01 (1)*
South Africa	09-13 (1)	05-09 (1) 09-11 (2) 11-12 (3) 12-14 (2) 14-16 (1)	22-00 (1) 00-03 (3) 03-06 (2) 06-13 (1) 13-14 (2) 14-16 (3) 16-17 (2) 17-18 (1)	21-23 (1) 23-01 (2) 01-03 (1) 22-02 (1)*
Central & South Asia	*Nil*	07-10 (1) 19-22 (1)	05-06 (1) 06-08 (2) 08-10 (1) 18-22 (1)	04-06 (1) 18-20 (1)
Southeast Asia	*Nil*	07-09 (1) 18-21 (1)	06-07 (1) 07-09 (2) 09-11 (1) 20-23 (1)	*Nil*
Far East	17-19 (1)	16-17 (1) 17-19 (2) 19-21 (1)	05-06 (1) 06-08 (3) 08-09 (2) 09-10 (1) 18-21 (1) 21-23 (2) 23-00 (1)	04-06 (1)
Pacific Islands & New Zealand	13-15 (1) 15-18 (2) 18-20 (1)	14-16 (1) 16-18 (2) 18-20 (3) 20-22 (2) 22-23 (1)	11-21 (1) 21-23 (2) 23-04 (3) 04-07 (2) 07-09 (3) 09-11 (2)	01-02 (1) 02-05 (2) 05-07 (1) 02-06 (1)*
Australia	18-21 (1)	07-10 (1) 16-18 (1) 18-21 (2) 21-23 (1)	14-16 (2) 16-22 (1) 22-00 (2) 00-02 (3) 02-06 (2) 06-09 (3) 09-11 (2) 11-14 (1)	03-04 (1) 04-06 (2) 06-07 (1) 04-06 (1)*
Northern & Central South America	09-13 (1) 13-15 (2) 15-17 (3) 17-18 (2) 18-20 (1)	06-07 (1) 07-08 (2) 08-10 (3) 10-12 (4) 12-14 (2) 14-16 (3) 16-19 (4) 19-20 (3) 20-21 (2) 21-22 (1)	02-03 (2) 03-06 (1) 06-07 (2) 07-09 (4) 09-11 (3) 11-16 (2) 16-19 (3) 19-00 (4) 00-02 (3)	18-19 (1) 19-20 (2) 20-03 (3) 03-05 (2) 05-07 (1) 21-01 (1)* 01-03 (2)* 03-05 (1)*
Southern Brazil, Argentina, Chile & Uruguay	11-13 (1) 13-15 (2) 15-17 (3) 17-18 (2) 18-20 (1)	06-07 (1) 07-09 (3) 09-15 (2) 15-18 (4) 18-20 (3) 20-21 (2) 21-23 (1)	03-06 (1) 06-08 (2) 08-15 (1) 15-17 (2) 17-18 (3) 18-21 (4) 21-00 (3) 00-03 (2)	20-21 (1) 21-03 (2) 03-06 (1) 23-04 (1)*
McMurdo Sound, Antarctica	15-17 (1)	08-10 (1) 13-15 (1) 15-18 (2) 18-20 (1)	02-07 (1) 07-09 (2) 09-12 (1) 16-18 (1) 18-21 (2) 21-00 (3) 00-02 (2)	00-05 (1)

*Predicted 80 meter openings. Openings on 160 meters are also likely to occur during those times where 80 meter openings are shown with a forecast rating of (2), or higher.

Time Zones: CST & MST (24-Hour Time)
CENTRAL USA TO:

	10 Meters	*15 Meters*	*20 Meters*	*40/80 Meters*
Western & Central Europe & North Africa	11-15 (1)	09-13 (1) 13-16 (2) 16-18 (1)	05-07 (1) 07-09 (2) 09-12 (1) 12-14 (2) 14-16 (3) 16-18 (4) 18-22 (2) 22-02 (1)	19-20 (1) 20-22 (2) 22-01 (1) 21-22 (1)* 22-23 (2)* 23-00 (1)*

Northern Europe & European USSR	*Nil*	09-16 (1)	05-06 (1) 06-10 (2) 10-14 (1) 14-17 (2) 17-19 (1) 19-22 (2) 22-00 (1)	19-23 (1)
Eastern Mediterranean	*Nil*	09-17 (1)	04-06 (1) 06-08 (2) 08-14 (1) 14-16 (2) 16-19 (1) 19-22 (2) 22-00 (1)	19-22 (1)
East Africa	13-16 (1)	07-13 (1) 13-17 (2) 17-19 (1)	05-06 (1) 06-08 (2) 08-14 (1) 14-17 (2) 17-19 (3) 19-20 (2) 20-22 (1) 22-00 (2) 00-07 (1)	20-23 (1)
West & Central Africa	12-16 (1)	07-10 (1) 10-12 (2) 12-14 (3) 14-16 (4) 16-17 (3) 17-18 (2) 18-19 (1)	05-08 (2) 08-14 (1) 14-16 (2) 16-17 (3) 17-19 (4) 19-21 (3) 21-23 (2) 23-05 (1)	20-01 (1) 22-00 (1)*
South Africa	08-11 (1)	05-09 (1) 09-10 (2) 10-12 (3) 12-13 (2) 13-15 (1)	22-02 (2) 02-04 (1) 04-07 (2) 07-14 (1) 14-17 (2) 17-22 (1)	21-02 (1) 22-01 (1)*
Central & South Asia	*Nil*	07-10 (1) 18-21 (1)	04-05 (1) 05-07 (2) 07-11 (1) 18-20 (1) 20-22 (2) 22-23 (1)	04-06 (1) 18-20 (1)
Southeast Asia	18-20 (1)	07-11 (1) 18-22 (1) 22-23 (2) 23-00 (1)	22-01 (1) 01-04 (2) 04-07 (1) 07-09 (2) 09-12 (1)	01-02 (1) 04-06 (1)
Far East	16-22 (1)	07-09 (1) 16-18 (1) 18-21 (2) 21-23 (1)	02-06 (1) 06-08 (3) 08-10 (2) 10-12 (1) 18-21 (1) 21-22 (2) 22-00 (3) 00-02 (2)	00-02 (1) 02-04 (2) 04-06 (1) 03-05 (1)*
Guam & Pacific Islands	12-16 (1) 16-19 (2) 19-21 (1)	13-16 (1) 16-18 (2) 18-20 (3) 20-22 (2) 22-00 (1)	07-09 (3) 09-11 (2) 11-18 (1) 18-20 (2) 20-22 (3) 22-00 (4) 00-02 (3) 02-07 (2)	00-02 (1) 02-05 (2) 05-07 (1) 01-02 (1)* 02-05 (2)* 05-06 (1)*
Australia & New Zealand	17-18 (1) 18-20 (2) 20-21 (1)	08-11 (1) 15-18 (1) 18-20 (3) 20-22 (2) 22-00 (1)	06-09 (3) 09-11 (2) 11-13 (1) 13-15 (2) 15-20 (1) 20-22 (2) 22-01 (3) 01-06 (2)	02-03 (1) 03-05 (2) 05-07 (1) 04-06 (1)*
Northern & Central South America	09-12 (1) 12-14 (2) 14-16 (3) 16-17 (2) 17-18 (1)	06-07 (1) 07-09 (2) 09-15 (3) 15-18 (4) 18-19 (3) 19-20 (2) 20-21 (1)	02-05 (2) 05-07 (3) 07-09 (4) 09-11 (3) 11-15 (2) 15-18 (3) 18-00 (4) 00-02 (3)	18-20 (1) 20-02 (3) 02-04 (2) 04-06 (1) 20-22 (1)* 22-01 (2)* 01-05 (1)*
Southern Brazil, Argentina, Chile & Uruguay	09-12 (1) 12-14 (2) 14-16 (3) 16-17 (2) 17-19 (1)	06-07 (1) 07-12 (2) 12-14 (1) 14-15 (2) 15-17 (4) 17-19 (3) 19-21 (2) 21-22 (1)	02-05 (1) 05-08 (2) 08-15 (1) 15-17 (2) 17-18 (3) 18-21 (4) 21-00 (3) 00-02 (2)	20-22 (1) 22-00 (2) 00-02 (1) 02-04 (2) 04-06 (1) 00-04 (1)*
McMurdo Sound, Antarctica	13-17 (1)	12-15 (1) 15-18 (2) 18-20 (1)	01-05 (1) 05-07 (2) 07-16 (1) 16-18 (2) 18-23 (3) 23-01 (2)	02-05 (1)

Time Zone: PST (24-Hour Time)
WESTERN USA TO:

	10 Meters	*15 Meters*	*20 Meters*	*40/80 Meters*
Western & Europe & North Africa	*Nil*	09-11 (1) 11-14 (2) 14-16 (1)	05-07 (1) 07-09 (2) 09-12 (1) 12-14 (2) 14-16 (3) 16-18 (2) 18-21 (1) 21-23 (2) 23-00 (1)	19-20 (1) 20-22 (2) 22-23 (1) 20-22 (1)*
Central & Northern Europe & European USSR	*Nil*	09-14 (1)	05-06 (1) 06-08 (2) 08-12 (1) 12-16 (2) 16-19 (1) 19-22 (2) 22-23 (1)	19-22 (1)
Eastern Mediterranean & East Africa	*Nil*	09-14 (1)	04-05 (1) 05-07 (2) 07-13 (1) 13-15 (2) 15-18 (1) 18-21 (2) 21-23 (1)	19-22 (1)
West & Central Africa	12-14 (1)	0 -11 (1) 11-14 (2) 14-16 (3) 16-17 (2) 17-18 (1)	05-07 (2) 07-14 (1) 14-17 (2) 17-20 (3) 20-22 (2) 22-02 (1)	20-00 (1)
South Africa	07-09 (1)	06-08 (1) 08-10 (2) 10-12 (1) 20-22 (1)	04-05 (1) 05-07 (2) 07-09 (1) 09-12 (2) 12-15 (1) 19-21 (1) 21-00 (2) 00-02 (1)	20-01 (1)
Central & South Asia	*Nil*	07-09 (1) 15-18 (1) 18-21 (2) 21-23 (1)	04-05 (1) 05-07 (2) 07-12 (1) 18-20 (1) 20-22 (2) 22-00 (1)	20-01 (1)
Southeast Asia	14-16 (1) 20-22 (1)	07-08 (1) 08-10 (2) 20-21 (1) 21-23 (2) 23-00 (1)	08-10 (2) 10-12 (1) 22-23 (1) 23-01 (2) 01-03 (3) 03-04 (2) 04-07 (1)	02-06 (1)
Far East	14-20 (1)	07-09 (1) 12-19 (1) 19-23 (2) 23-01 (1)	07-09 (3) 09-11 (2) 11-19 (1) 19-21 (2) 21-23 (4) 23-01 (3) 01-07 (2)	01-02 (1) 02-05 (2) 05-07 (1) 02-05 (1)*
Guam & Pacific Islands	12-16 (1) 16-19 (2) 19-22 (1)	12-14 (2) 14-16 (1) 16-18 (2) 18-21 (3) 21-22 (2) 22-00 (1) 07-09 (1)	06-07 (2) 07-09 (4) 09-10 (3) 10-12 (2) 12-16 (1) 16-18 (2) 18-20 (3) 20-23 (4) 23-01 (3) 01-03 (2) 03-06 (1)	23-01 (1) 01-05 (3) 05-06 (2) 06-07 (1) 00-02 (1)* 02-05 (2)* 05-06 (1)*
Australia & New Zealand	12-14 (2) 14-18 (1) 18-20 (2) 20-21 (1)	10-12 (1) 12-17 (2) 17-19 (3) 19-21 (4) 21-22 (2) 22-00 (1)	09-11 (1) 11-13 (2) 13-18 (1) 18-20 (2) 20-22 (3) 22-02 (4) 02-06 (2) 06-08 (4) 08-09 (2)	00-01 (1) 01-05 (2) 05-06 (1) 01-02 (1)* 02-04 (2)* 04-05 (1)*
Northern & Central South America	08-12 (1) 12-14 (2) 14-15 (3) 15-16 (2) 16-17 (1)	06-09 (1) 09-11 (2) 11-15 (3) 15-18 (4) 18-19 (3) 19-20 (2) 20-21 (1)	02-05 (2) 05-08 (4) 08-10 (3) 10-15 (2) 15-17 (3) 17-22 (4) 22-02 (3)	19-21 (1) 21-01 (3) 01-02 (2) 02-05 (1) 20-22 (1)* 22-01 (2)* 01-04 (1)*

[*Continued on page 96*]

THIS month we're proud to introduce a new editor for CQ's now-traditional Question and Answer column and reader-aid service. For eight years the task was handled most ably by Chuck Schauers, W4VZO, ex-W6QLV, ex-F7FE, most recently working out of Luzern, Switzerland. Chuck, however, has moved on to a still bigger writing assignment with one of the large consumer-oriented electronics magazines. We wish him every success.

In his place, we present Bert Simon, W2UUN, who will henceforth play "answerman" for CQ. Bert comes well-recommended by his 20 years of ham experience, a BSEE degree from Newark (N.J.) College of Engineering, and his long-time employment in the field of commercial radio communications. Bert has worked for Aircraft Radio Corp., Fairchild-Dumont Labs, Radio Engineering Laboratories, and Westrex Co. in the design of single sideband and mobile radio systems. He has also acted as a manufacturer's representative for Viking Instruments (manufacturers of radio monitoring/alerting receivers). Bert currently operates a sales/service agency for General Electric two-way communications systems, and does communications consulting on the side. Among his other interests are flying (single-engine sea-plane rating), and ragchewing on v.h.f. s.s.b., although he has operated, (and still does), on all the popular ham bands and modes.

We hope you'll find Bert's easy, free-wheeling style to your liking. His sense of humor is lively and permeates practically every facet of his work, but rest assured he'll never take your problems or answers lightly.

Mr. Simon, carry on!

Simon Says...

BY BERT SIMON,* W2UUN

BEFORE going too deeply into this first column effort, I would like to clear up (ahem!) one great misconception about the origin of my good old great, great, great, grand uncle Simon. Seems that good old Uncle Simon lived in a small European village where he owned a bicycle shop. Uncle Simon was an inventive fellow, and one day came up with a bicycle handle-bar of radically simple design. Wholely by accident, an itinerant pie vendor happened to be ambling by on his way to a fair when he stopped to rest for a moment under a shade tree in front of Uncle Simon's shop. Uncle Simon soon began to chat with the pie-vendor, who asked "What's your handle?", which in the strange vernacular of the day meant, "What's your name?" Now, Uncle Simon never was a very contemporary character, and in his ignorance proudly answered, "Simple!" Well, that's how it all began, and there was no stopping it. From that day forward, good old Uncle Simon was to be known as Simple Simon. Sad.

But enough of the Simon family history . . . let me remove tongue from cheek and get on with the job at hand.

Questions

Collins vs. Heath?—"As you are probably aware, the present day's ads are filled with all kinds of superlatives for whatever the company wants to sell. I would appreciate *your* opinion on one area. The Collins company is certainly considered to be in the top bracket as far as radio equipment is concerned. Heath Company is certainly considered to be an excellent company. Interestingly enough, their amateur gear bears a striking resemblance to each other from an appearance standpoint. Presuming that the Heath outfit is put together properly in accordance with instructions, how would you rate it against the Collins set?"

As for Heath vs. Collins, yes, they are both fine companies. The equipment they manufacture is also very good and as for myself, I'm both a Collins and Heath user. It's the same old story, you get what you pay for. Circuit- and performance-wise they're about the same, but you'll find better mechanical construction in the Collins equipment. In particular their v.f.o. and dial read-out can't be beat. Price-wise I would say the best buy would be Heath unless you want to consider trade-in value and in that case you may be ahead with Collins.

SCR-522—"I would like to know if I can perform any possible changes in the positions of controls on an SCR-522 surplus transmitter/receiver? V.h.f. manuals state that I must keep all leads as short as possible so I am afraid to rearrange any of the controls for fear of causing trouble."

The only controls that you can move are potentiometers. Don't plan on moving any of the capacitors, as the v.h.f. manuals are right. Would you believe an arrangement as shown in fig. 1?

---

*Holland Mountain Rd., Oak Ridge, N.J.

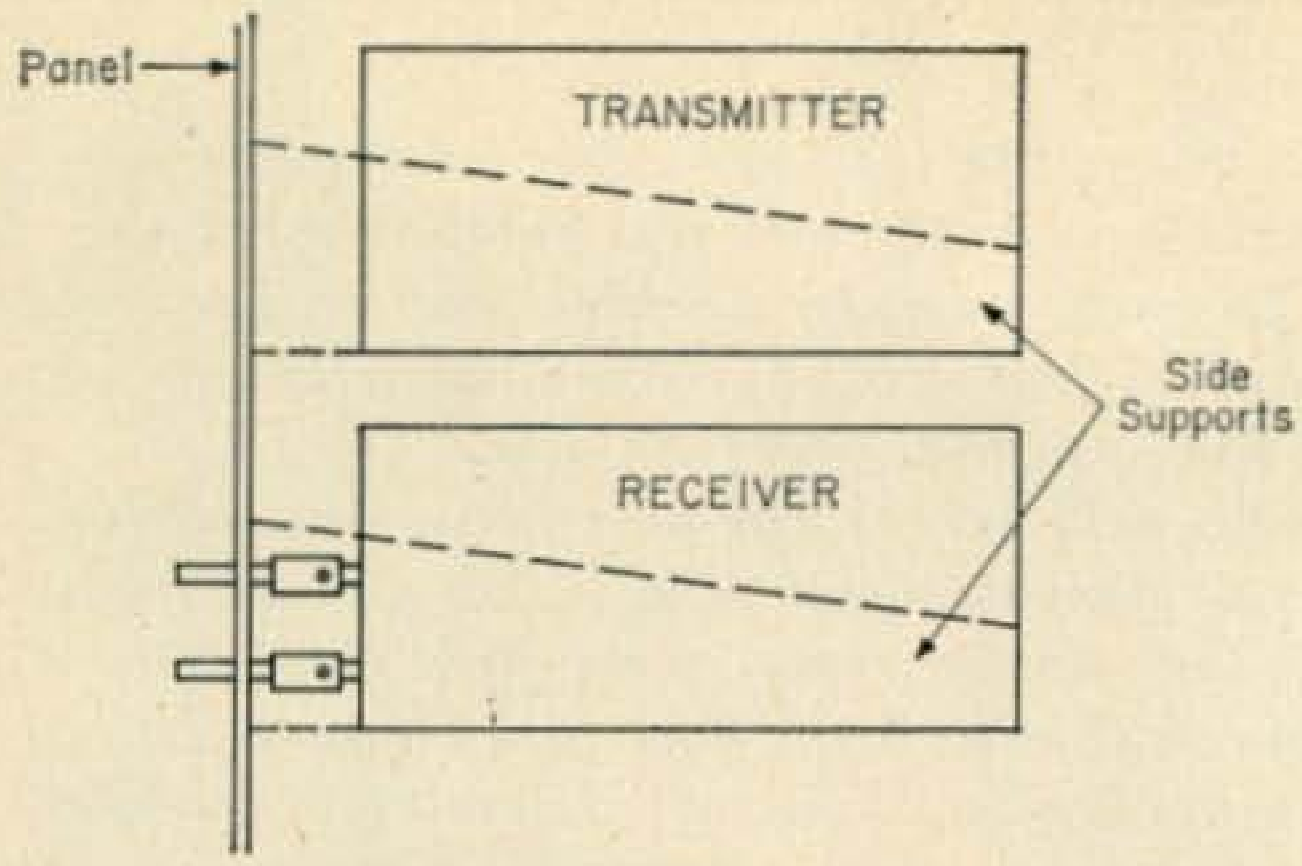


Fig. 1—Suggested mounting of SCR-522 behind a panel.

No 50 kc Source—"I have a Drake 2B receiver which I wish to align, I need a 50 kc signal source to feed into the 6BA6 i.f. amplifier. I am unable to find a signal generator in any of the electronic catalogs that goes below 75 kc. I have tried several crystal oscillator circuits, using a tube-type 50 kc crystal oscillator, but they proved to be unsatisfactory. Could you suggest any other way of getting a 50 kc signal?"

If you're really determined to buy a signal source, what about using an *audio* oscillator that goes that high? Heath has a model IG-82 that provides sine or square waves from 20 c.p.s. to 1 mc. In the interest of economy I would suggest you forget trying to obtain a 50 kc source and handle the problem this way: Make sure that your 2nd oscillator and mixer are working, let the mixer provide the 50 kc source for you. If you happen to be 1 or 2 kc off, that's of little consequence, providing that you can tune all the i.f. circuits to that frequency. The accuracy would depend, of course, upon how accurate a signal for the 1st i.f. you can provide.

Heathkit Comanche MR-1—"I have a Heathkit Comanche MR-1 receiver which never stops drifting. I installed the additional i.f. transformer, 6BZ6 tube and modified the 6EA8 mixer, as described in the June '64 issue of *CQ*, ("Upgrading the Comanche Receiver"). This change did everything that the author said that it would, except that the receiver continues to drift upward in frequency, as long as the set is in sideband operation. This makes it rather difficult to operate with any degree of satisfaction. There appears to be considerable heat in the vicinity of the b.f.o. I would also like to know whether it would be practical or advisable to modify the b.f.o. to the crystal type as used in the HR-20 receiver. If so can you send me a schematic?"

First of all, I'm fresh out of HR-20 schematics, but perhaps Heath could help you on that. Second, I assume you modified the 6EA8 mixer as per article, but make sure that the screen voltage of the 6EA8 mixer is not more than about 100 volts. Third, perform this little trick of centering the plates of the oscillator tuning capacitor (as was originally described in the May 1948 issue of *CQ* in an article, "Improving Receiver Stability.") The oscillator section of the tuning capacitor must be centered in order to minimize the change in capacitance due to shaft expansion with temperature change. To center this capacitor apply a steady r.f. signal to the input of the receiver using the b.f.o. to provide an audible signal in the speaker. Next loosen the locking screw on the rear capacitor bearing and turn the screw in or out until a point is found where the pitch of the signal starts to go in the opposite direction. This will indicate that electrical center has been reached and passed. Adjust the screw until the exact point is reached where the audible note reverses itself. (I've just quoted almost exactly from the article). This little trick is best appreciated on general coverage sets where a large value tuning capacitor is employed but it's simple and effective enough to be tried on most any set where you are experiencing stability problems. Of course there is one thing you should ask yourself (or the manufacturer): What are the limitations of this receiver? Perhaps the drift you are experiencing is all that you can expect with that particular type of receiver. Generally, good s.s.b. receivers employ a crystal first oscillator for stability, which the MR-1 does not. B.f.o.'s are much more stable than first oscillators due to lower operating frequency, I would expect, typically, that the drift of the b.f.o. would be in the order of 10 percent of the first oscillator so that any improvement on that part would be insignificant and I wouldn't recommend changing to a crystal b.f.o. There's always the chance that it could be causing a problem, but that would be easy to confirm by turning off the b.f.o. and using a good stable transmitter to provide a beat (like in the calibrate or spotting position). If you still experience the same amount of drift when copying s.s.b. signals, then it's confirmed that your trouble is with the receiver's first oscillator.

Ham TV (ATV)—"I am very interested in ATV and would like to know where I could find any information on this subject. Also some questions:

1. Just what is slow-scan TV?
2. How may it be used on the low frequency bands?
3. Can a regular 420 mc converter be used for the TV receiver and can a (channel 13 output) camera's output be doubled then fed into a linear amplifier for the signal output?"

Slow-scan TV is similar to the type of television employed on the Mariner spacecraft to transmit pictures back to Earth, it's not a 'real time' device since it may take minutes to transmit one frame of a picture instead of a fraction of a second as in home entertainment type TV. In radio transmission one can transmit a lot of information in a small amount of time and require a large bandwidth. Naturally the 2-5 mc bandwidth required to transmit a TV signal as is normally viewed on your TV screen is not available on the low frequencies, so hams resort to the method

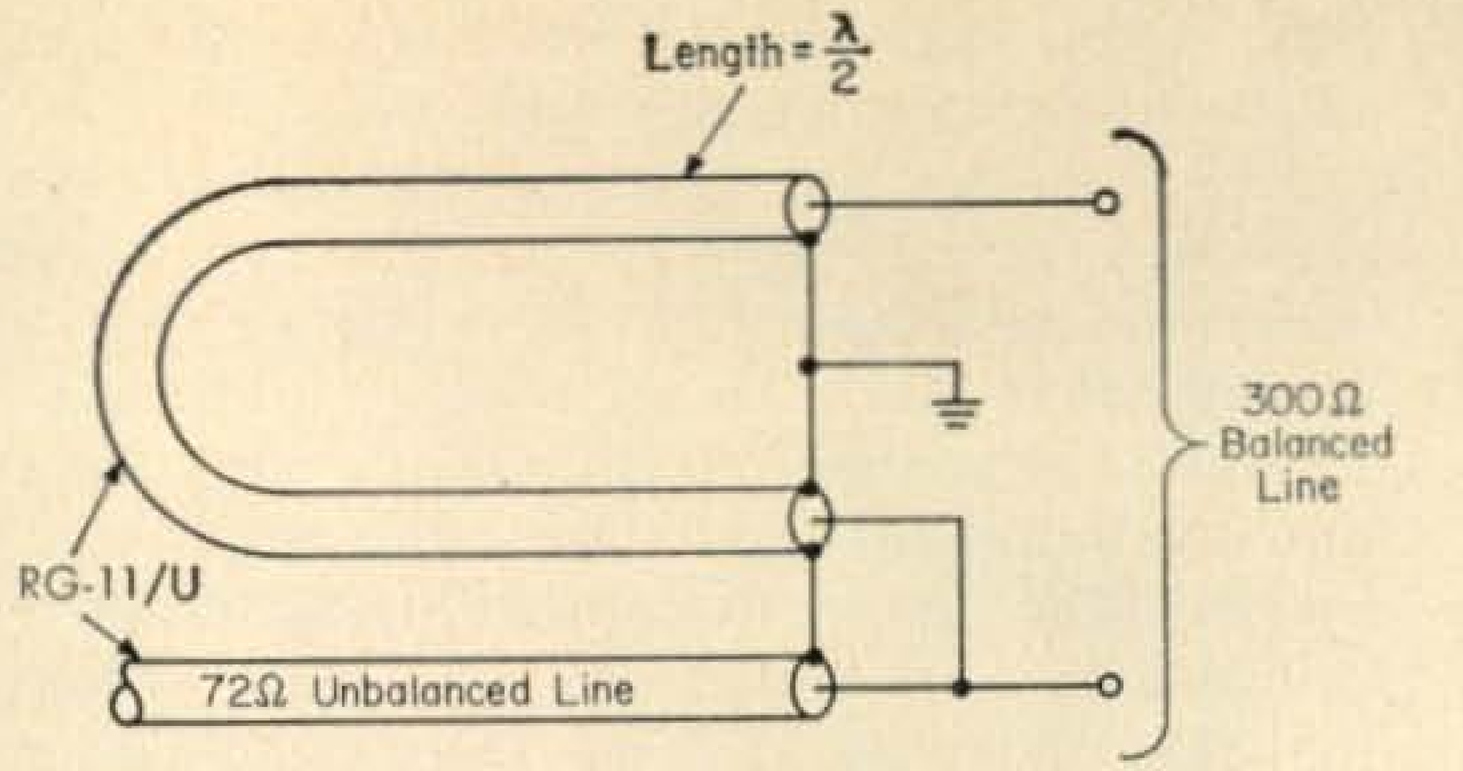


Fig. 2—Conventional 4:1 balun.

called 'slow scan' where a relatively small bandwidth is required. Simply think of it as 'painting' the picture on the screen very slowly. Yes, you can use a 420 mc converter and feed it into your regular TV set. Forget trying to double the output of a TV signal from a camera to get it to whatever frequency you want. You must treat this signal in a linear manner just as in s.s.b. so that you'll have to heterodyne it and then if you need amplification it must be with linear amplifiers so as not to create distortion. You can purchase a booklet called *ATV Anthology* for \$3.00 and a booklet called *Surplus TV Schematics* for \$1.00 from 73 books, Peterborough, New Hampshire.

Matching 412 ohms to 50 ohms—"How can I match a folded terminated (412 ohms) dipole antenna to a 50 ohm transmitter? I plan to use a 300 ohm 'twin line' transmission line."

There are a number of solutions to your problem. The simple one being to use a 4:1 balun from your 300 ohm line to a 72 ohm line or place the balun at the antenna and go coax all the way. Generally transmitters have no trouble matching 50 to 72 ohm impedance output. You can buy a 1kw balun for 3-30 mc from Unadilla Radiation Products, Unadilla, N. Y., 13849, for \$12.95 (specify model 4:1, 75 ohm coax to 300 ohm balanced) or you can make one from RG-8 cable as shown in fig. 2.

Another solution is to construct an L-network as shown in fig. 3. You didn't mention what frequency you plan to use, but let's take a typical case: 7.0 mc. With R in at 412 ohms, and R at 50 ohms, C is about 148 mmf, and L is about 3.07 uh.

For your info these values are derived as follows:

$$X_L = \sqrt{R\,(R_{in}) - R^2}$$

$$X_L = \sqrt{50\,(412) - 2500}$$

$$X_L = 134.6 \text{ ohms}$$

$$L = \frac{X_L}{2\,\pi\,F}$$

$$L = \frac{134.6}{2\,\pi\,(7)}$$

$$L = 3.07\ \mu\text{h}$$

To find the actual number of turns needed:

$$n = \frac{\sqrt{(9r + 10l)L}}{r}$$

where:

r = radius of coil

l = length of coil

L = inductance in μh

n = number of turns

To find the needed capacitance:

$$X_C = \frac{\mathrm{R}\cdot\mathrm{R}_{in}}{X_L}$$

$$X_C = \frac{50\,(412)}{134.6}$$

$$\mathrm{X}_C = 153 \text{ ohms}$$

$$C = \frac{1}{2\,\pi\,F\,X_C}$$

$$C = \frac{1}{2\pi\cdot 7\cdot 153}$$

$$C = 148.5 \text{ mmf}$$

Summing Up

That wraps up this first installment of "Simon Says". I hope the much more detailed approach to both questions and answers proves as interesting and informative to the reader as it is to the guy behind the typewriter. Till next month, then, 73, and illigitimus non-carborundum.

Bert, W2UUN

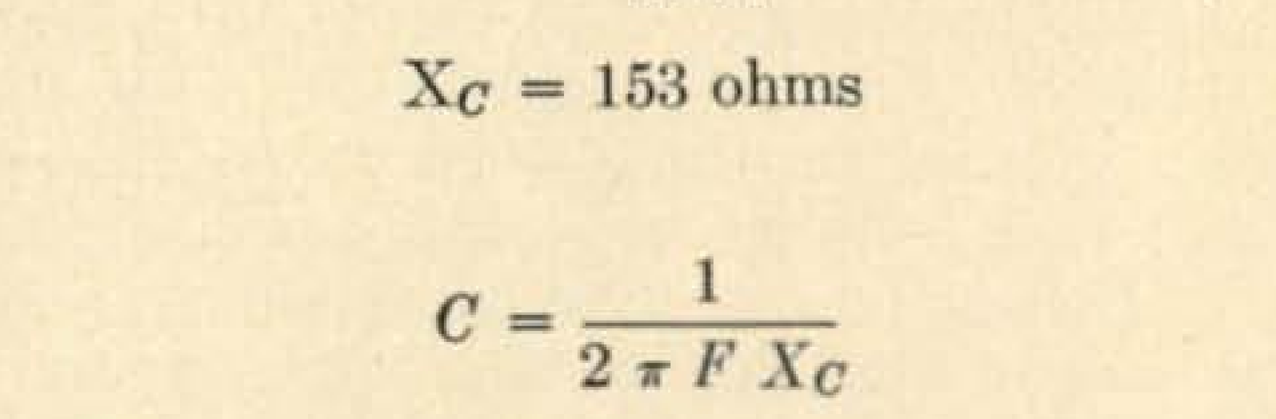


Fig. 3—Simple impedance step-up L-network.

SIMON SAYS is a free technical question and answer service provided exclusively by *CQ*. Every attempt is made to answer the questions of readers as promptly and accurately as possible. Occasionally, Simon Says will be stumped, but it rarely happens.

To receive the quickest reply, we suggest including a self addressed stamped envelope for each question. One question per letter also makes life easier for Mr. Simon.

Address questions to "Simon Says" c/o *CQ*, The Radio Amateurs Journal, 14 Vanderventer Ave., Port Washington, L.I., N.Y., 11050 or to Mr. Bert Simon, Holland Mountain Road, Oak Ridge, N.J.

SURPLUS sidelights

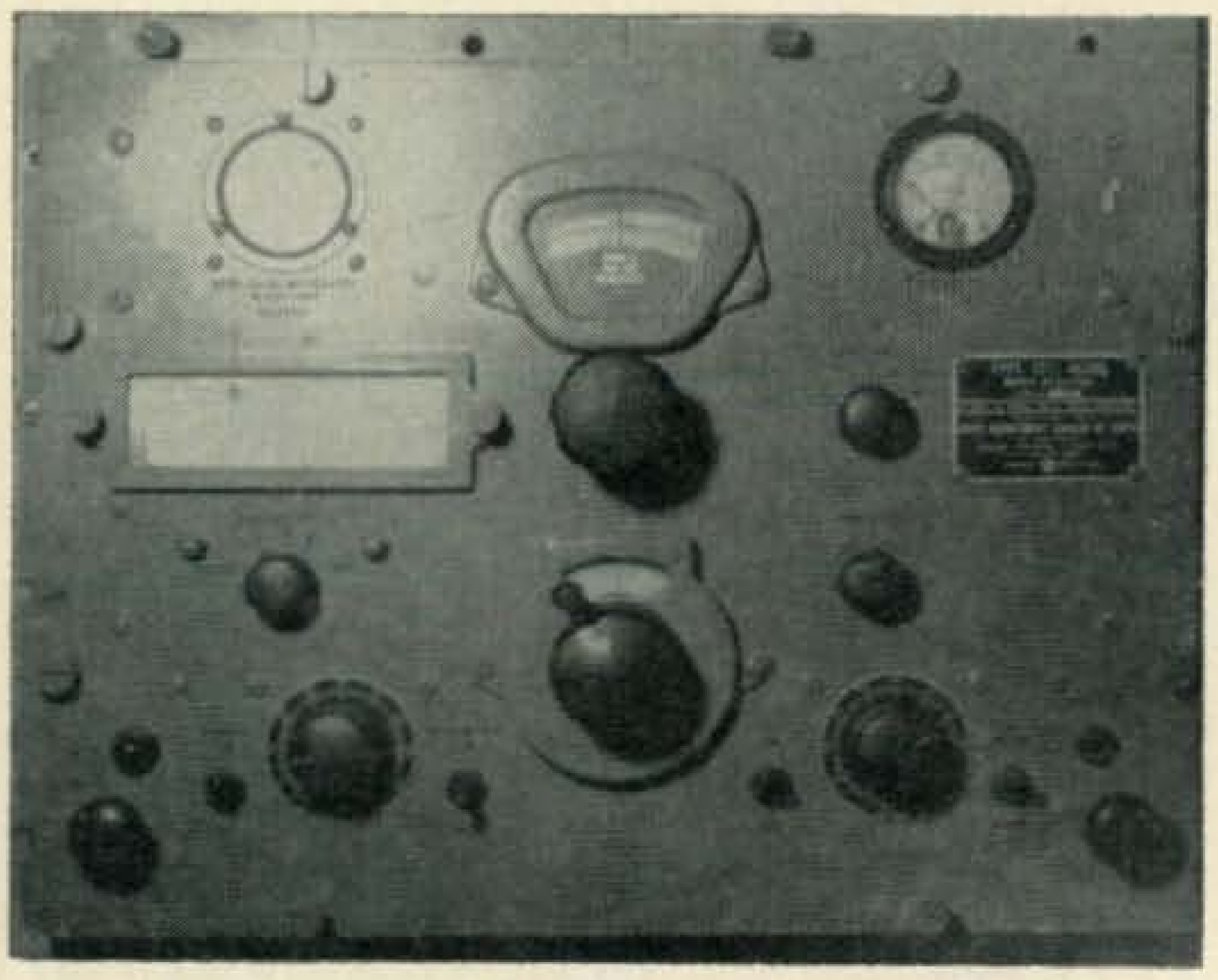
BY GORDON ELIOT WHITE*

LAST month I discussed surplus v.h.f. equipment, describing in detail the AN/ARN-30 navigation receiver which covers 108-135 mc. This time I am reversing my field to cover v.l.f. (very low frequency) gear.

V.l.f. is a bit of a surprise because of the continuing wide interest in a band that has not been used by amateurs for many years, and which carries virtually no voice communications. For decades however, low frequencies, below 500 kc, have been used by maritime stations, booming with virtually fade-proof c.w. signals. The band has been in large part Navy property, particularly since World War II, with Bluejacket stations such as Cutler, Maine, and the Canal Zone putting out signals down to 10 kc.

V.l.f. installations have gone into Australia and several classified locations to support the 41-ship Polaris nuclear sub fleet with communications that can be received while submerged.

On trips aboard the subs Andrew Jackson and Thomas Jefferson I got a look at some of the sophisticated electronics involved in control of nuclear armament halfway around the globe, a hundred fathoms down. Much of it cannot be discussed even now, and much of it will never see the surplus market, though I drooled at a few pieces in the communications shack. Transistorized equipment, designed to save space, heat and electric power; all printed-circuit construction with spare boards to be plugged in for repair if necessary, self-contained failure indicators and much, much more.



The RBA low frequency receiver. It covers 15-600 kc. It is labeled CFT-46300, a number which indicated the manufacturer (Federal Telephone Co.) and the Navy number 46 which meant receiver, followed by 300, three digits which indicated the contract and model number. It requires a separate rectifier unit, but normally operates from 115 v.a.c. power.

It is no longer classified to reveal that the subs use low-frequency crypto broadcasts for strategic orders, circuits kept full of traffic so that an enemy cannot surmise anything by a change in the message volume. As an aid, the subs use an antenna buoy that can be floated to within a few inches of the surface to improve signal reception.

The long long waves of v.l.f. are so reliable that they make an ideal naval communications medium, for surface as well as subsurface craft. Most of the surplus v.l.f. sets therefore are Navy designs, though one World War II set was an Army receiver.

More recently however, highly precise time and frequency standards have been set up on v.l.f. frequencies such as WWVB, 60 kc, and WWVL, 20 kc as adjuncts to the high-frequency WWV services. These signals are used in space work and many other scientific areas, such as for example the precision tracking of satellites to measure the effect of magnetism and other forms of drag upon them.

The Navy's stations in the v.l.f. band include NAA and NSS (at 19.4 kc) and NLK and NPG.

v.l.f. Receivers

AN/SRR-3	This is a Scott s.l.r.f. set covering 80 kc to 24 mc.
DAF	A direction finder, not true v.l.f., as it covers 80-3500 kc.
RBL	A solid old National design, circa 1941, the book is NavShips 900350, and it tunes to 15 kc.
RBJ	A Navy HRO, it covers 50-400kc and 480—30,000 kc. Bulky.
AN/URR-2	An RCA design, it covers 14 kc to 32 mc in 14 bands. For small craft.
AN/URR-36	A version of the National HRO-50 covering 50 kc to 35 mc. The book is NavShips 92563.
AN/URR-39	This tunes 50 kc to 30 mc in 5 bands. Made by National.
R-212/SR	It tunes 15 kc to 650 kc, same as the Radiomarine 128/AY. The book is TM-11-868. Cheap.
R-215/SR	An RCA AR-8510, tuning 15-650 kc. Inexpensive design.

A chart of v.l.f. receivers

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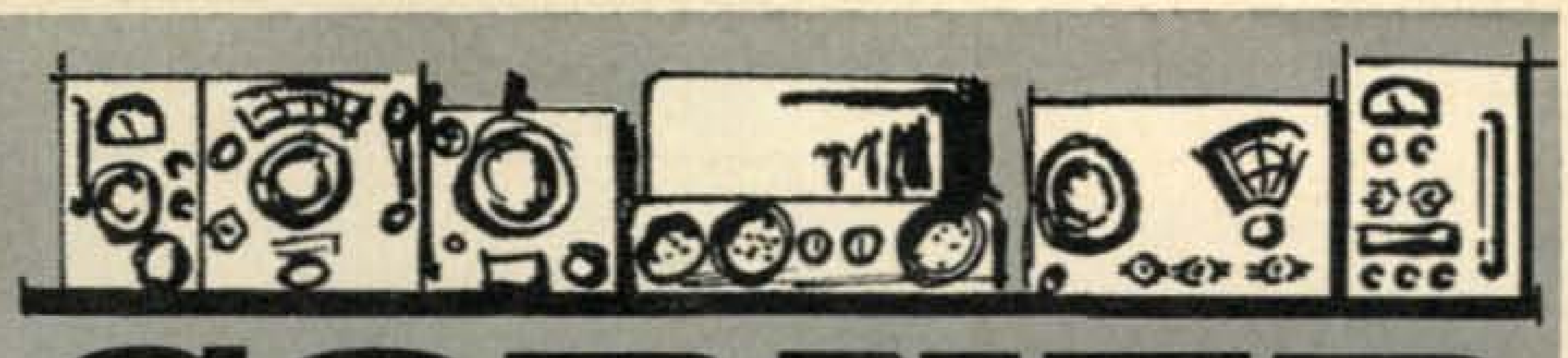

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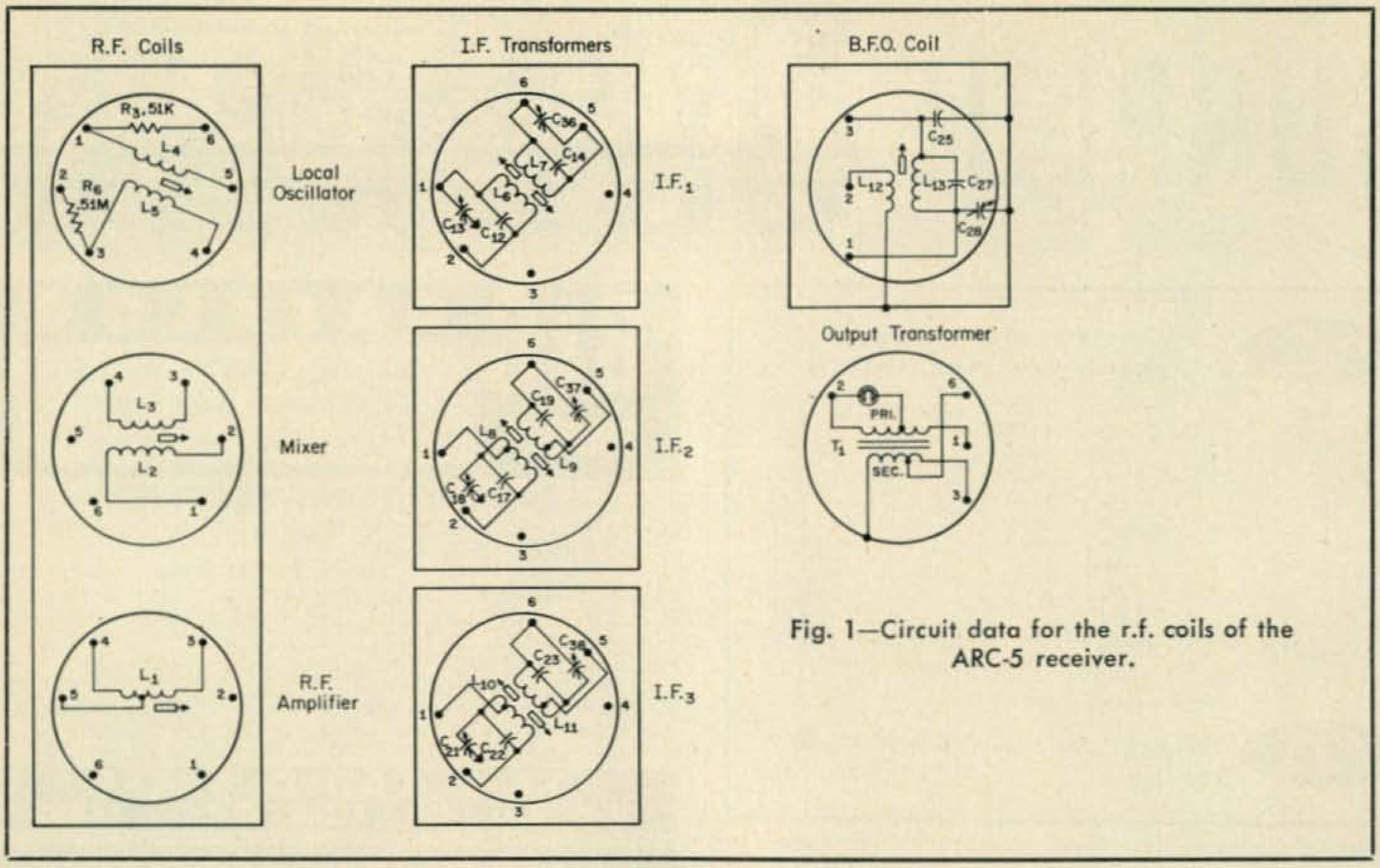

Fig. 1—Circuit data for the r.f. coils of the ARC-5 receiver.

There is more activity at v.l.f. in recent years, and more equipment in use by all three services. In civilian production, the National HRO-500 general coverage receiver goes down to 5 kc, one of a very limited number of non-military sets to cover the bottom band.

The apparent best of the military bunch today is the R-389-URR, which covers 15 to 1500 kc. This is a Collins, digital-tuning design, companion piece to the R-390 HF receiver. The R-389 can tune c.w., a.m., m.c.w., etc. and has automatic bandswitching capability. Tuning may be motor driven as well. Selectivity can be adjusted from 100 c.p.s. to 8 kc in 5 steps. Power input is 115 or 230 volts, 60 cycle, a.c. This set uses 37 tubes and weighs 82 pounds, and it is worth every stable ounce. The TM is 11-855.

Also an excellent receiver is the SP-600-vlf, a Hammarlund version of the popular SP-600 general coverage receiver. The vlf set is not too common, but is a real gem if you can find one. Unfortunately, data on it is lacking here; write to Hammarlund—they are very helpful about queries on their equipment.

These are the 1955 era v.l.f. receivers. In military usage they have been superseded by the Magnavox AN/WRR-3, for example, and the AN/URR-45. The WRR-3 covers 14 kc to 600 kc in five bands. The set is dual conversion superhet, digital-tuned. Calibration points are provided at 10 kc intervals. The i.f.'s are 60 and 200 kc and the required power supply is 115 volts a.c. First procurement was in 1960. The manual is NavShips 94112. The URR-45 is a transistorized version, 10 to 640 kc, of modular construction. The book on the URR-45 is NavShips 93400.

More common in surplus and MARS channels in the R-439/SRR-11, a companion to the SRR-12, SRR-13 high-frequency sets. The R-439 covers 14 to 600 kc in five bands, and in appearance it is similar to the higher band units—gray waterproof case, containing modular (submini tube) circuit sections. The manual is NavShips 91875. There are identical units under nomenclature FRR-21 which has a non-waterproof case for shore work and MRR-1 which is designed for portable use. The FRR-1 is similar but has a crystal-controlled local oscillator. The manual on the FRR-21 is 92211.

My own preference is to leave the FRR-21, SRR-11, MRR-1 sets strictly alone. They often carry a tall price tag in surplus emporiums, but I find them noisy and difficult to work on. The Navy pulled out a module and plugged in another, but for we surplusers, maintenance requires unsoldering all those subminiature tubes.

Much more to my liking is the RBA, an oldtimer which I described briefly last fall along with its companion RBB, RBC sets. The RBA covers the same 15 to 600 kc band, and is a TRF set, but you can get pretty sharp selectivity at v.l.f. in the big inductances involved, and anyway, the chronic QRM that made the TRF obsolete is not to be found in the v.l.f. region.

The RBA is bulky, and it uses a separate power unit. It is built like the battleships it served on however, and uses old reliable octal tubes, none of which are at all rare. It was last built in 1952. It is a snap to work on because there is room in the thing, and it doesn't require much work as a rule. Remember—miniaturization is not really designed to make the equipment work *better*, just *smaller*. The RBA works real well. The manual is NavShips 91319.

Another old reliable is the RAK-7 (and others in the RAK series) which covers the same 15-600 kc region. This is another TRF set, and was designed in the early nineteen-thirties, making it a bit hoary. I like to stay with the post 1935 equipment, i.e. the dawn of the octal tube. By this standard, and by its somewhat questionable reliability, the RAK falls short of the RBA, though it is capable of pulling in the signals. The Book is NavShips 95231 or 95232.

I have heard the RAZ receiver highly-touted for v.l.f.—it covers the usual 15-600 kc band—but I cannot vouch for it on my own knowledge. It is an RCA marine set, probably just a maritime service unit with a USN tag. It only cost $300 new, vs $2900 for the RBA-7, so one might conclude that the RAZ was a bit the cheaper construction. The RAZ book is NavShips 95936.

I have noted before that useful antennas were not often found in surplus. One rare unit, possibly worth mentioning here, is the AT-317/BRR, a v.l.f. loop used on submarines for surface or submerged reception. The exterior unit looks like the old Bendix aircraft teardrop antenna. With its CU-352/BRR coupler the system allows fair to good reception, even a few fathoms down. There was another submarine antenna, the AS-1014/B, a torpedo-shaped buoy which lifted an AT/497-U high-frequency whip out of the water at the end of an RG-17A/U cable, for submerged communications, but when I was aboard the Polaris subs this had been abandoned as too risky—especially for cruising in Soviet waters. The setup was chiefly used in maneuvers with friendly forces, even to carrying the required international running lights for night cruising. The book, for any submariners reading this, is NavShips 93334.

My research shows ten other realtively common v.l.f. receivers in surplus. Their characteristics are similar to those mentioned above, though most are less expensive in terms of original cost. I list them here as a guide to the species.

Despite the plentitude of v.l.f. models, there are far fewer low frequency units in surplus than higher-band receivers, simply because v.l.f. has been used for long-haul circuits rather than the multitude of shorter-range jobs in military and naval communications. It might be worthwhile to outline therefore, a quick and relatively simple way of building a v.l.f. set, particularly for the 15-45 kc area, virtually the bottom of useful electromagnetic communications today.

As most *CQ* readers know, I am the original fan of the Command set design. By following available data, the SCR-274-N and AN/ARC-5 receivers can be converted to cover the entire 15 kc to 50 mc spectrum. I worked up a v.l.f. version last winter which is somewhat unconventional, but follows a logical line of design, I believe, and which will tune the bottom band quite handsomely.

The chief design problem of a v.l.f. superhet is the extreme range of capacitance required to cover a reasonable band. A variable that will cover 6-9 mc, will when put into a v.l.f. oscillator, only tune from 15 to 30 kc, i.e. the same 2:1 ratio of lowest to highest tuned frequency. Another problem is the intermediate frequency: it is undesirable to use an i.f. which falls within the chosen r.f. band. To use one rule of thumb that calls for an i.f. less than half the lowest tuned frequency—a point that might be, say, 6 kc, is in the audio range. The i.f. coils would tend to become enormous and other problems assert themselves.

My solution was to use an i.f. above the incoming r.f. In fact, for a 14-45 kc coverage, 239 kc is a fine i.f. Your local oscillator would want to tune from 254-284 kc, a spread that can be obtained with reasonably-sized inductances. It was quite simple to set up an oscillator stage to work in this set. I replaced the original L_4 L_5 in my command receiver with a modified mixer coil (originally L_2, L_3) from the 190-550 kc set. By paring down the new L_4 winding it is relatively straightforward work to make the oscillator tune 254-284 kc. You can monitor the frequency as you adjust the oscillator windings by tuning it in on another R-23/ARC-5 or BC-453, since the desired range falls within their 190-550 kc coverage.

Obviously the tuning ratio of the oscillator is nowhere near the approximately 3:1 coverage of the low frequency receiver's tuning capacitor, so there must be padding in the circuit to swamp the amount of variation. I changed C_{10} from 690 mmf to about 50 mmf, which made tracking of the resulting frequency pretty close to optimum.

I took one of the windings from an 85 kc BC-453 i.f. transformer and wired it as the antenna coil (L_1) and two other 85 kc i.f. windings were modified to serve as L_2 and L_3 in the new set. (no L_{16} was used. This is a low-impedance loop input in some ARC-5 sets which I did not require in the conversion).

Returning for a moment to the oscillator section: it is simple to adjust the L_4 winding by listening to the oscillator on another receiver, with fine adjustments made in the powered iron adjustable core slug, but the L_4 tickler must be trimmed by indirect means. I removed about a third of the turns and adjusted further by experimentation. The chief requirement is that there

A bottom view of the R-23-A receiver converted to cover the v.l.f. band 15-45 kc. Left to right are: the new oscillator windings, L_4 and L_5; the mixer stage, L_2 and L_3, and on the right the antenna coil, L_1. L_4 and L_5 are made from a BC-453 coil and the others are pared-down sections from 85 kc i.f. cans out of the BC-453 or R-23/ARC-5.

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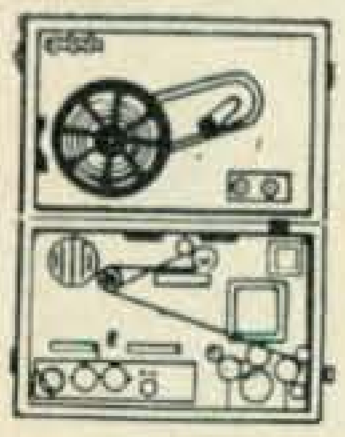

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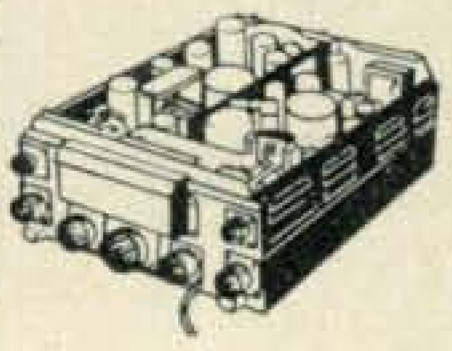

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be just enough feedback to get reliable oscillation, which is not too difficult a process.

The input coil, L_1, is easy to tune since it is a single winding. You just look for the maximum volume while receiving an external signal.

The mixer section is perhaps the hardest, since you must tune two windings. I found it necessary to add about 280 mmf across L_2 (outside the coil can) which is similar to the solution that was used in the original command set design in some ranges (see C_{39} in the 190-550 kc sets). This tunes the plate load of the r.f. amplifier below the lowest tuned frequency, and improves the response across the band. L_3 of course is tuned by the variable, C_4B, to the incoming signal.

To use two 85 kc i.f. windings in the small r.f. amplifier can it is necessary to mount one of the new coils in the top of the small aluminum can. You should discard the strap that holds the three cans together and modify the individual assemblies either by drilling holes in the outer end for tuning purposes or for mounting L_3.

All this is more easily done than explained. For reference, see the schematic in my Command Set article in the January, 1967 *CQ*, p. 23. Note that C_8 is not labelled. It is found between L_4 and C_9.

Other v.l.f. ranges may be set up, within the 3:1 ratio of the tuning capacitor, i.e. 45-135 kc or 65-190 kc. Because of the limitation of the maximum to minimum capacitance change in the variable C_4 it is not possible to cover the entire 10-190 kc band in any one set. In the military v.l.f. receivers this problem is solved by bandswitching, with, for example, the AN/FRR-21 requiring four bands to cover 14-233 kc.

Fig. 1 is a diagram of the r.f., i.f. and b.f.o. coils in the Command receivers, illustrating the references above. Note that L_1 need not be tapped. The input to the 12SK7 r.f. tube may be attached, through C_3, at the top of L_1, as it is in some Command Set versions.

I have a good supply of the three front-end coils for the 190-550 kc receivers, which can be used as a basis for a conversion. I can supply these at 25¢ each or a set of three for 50¢, to cover postage. I have a few of the single i.f. windings for 85 kc, and will send these to interested amateurs for 50¢ each.

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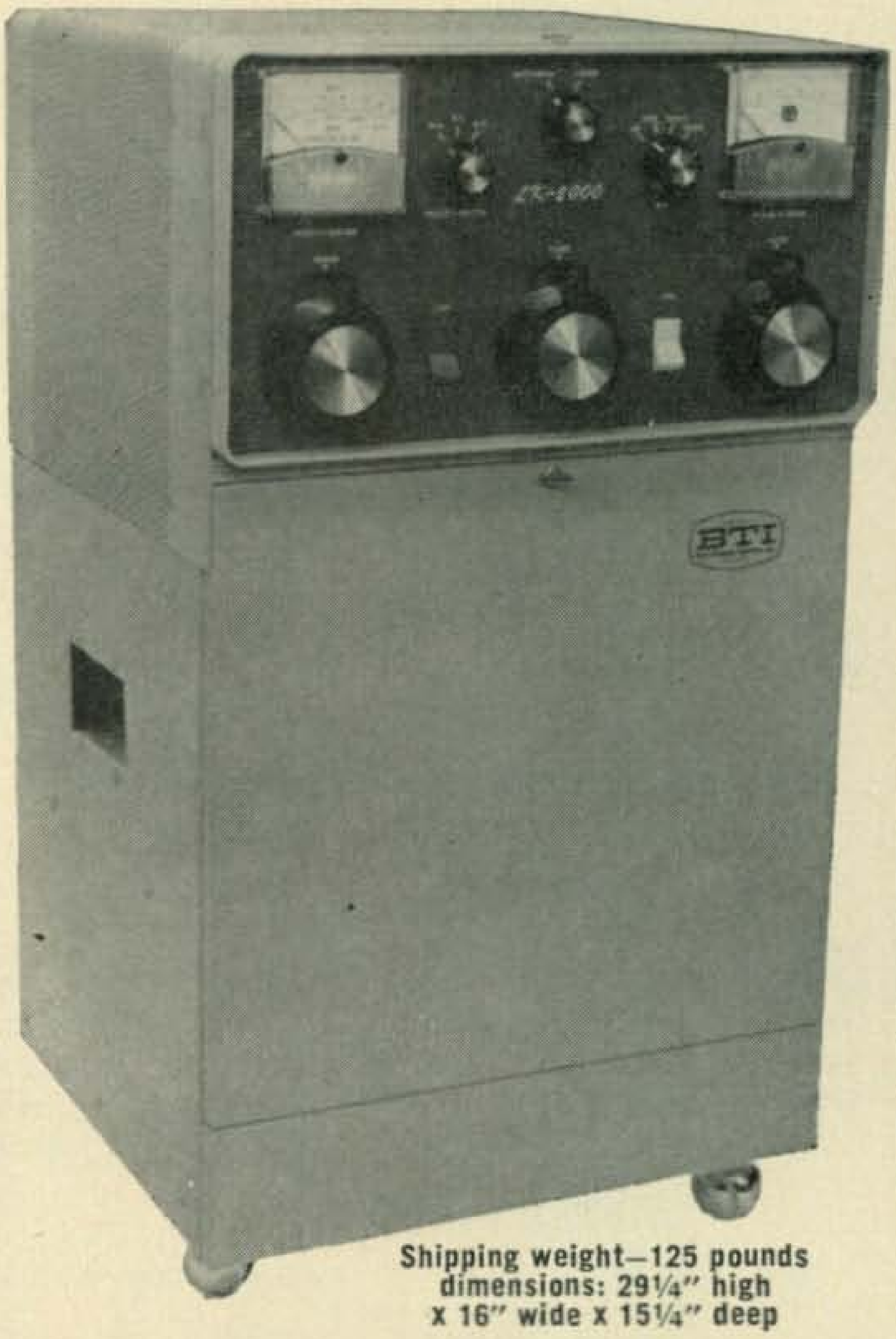

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Announcements *[from page 10]*

Kansas City, Mo.

The Jayhawk Amateur Radio Society announces a Hamfest and joint ARRL section meeting to be held April 23, 1967 at Wyandotte County Park, just East of Ag. Hall of Fame, Bonner Springs, Kansas. Free hot dogs, chips, and drinks—gifts for ladies and amateurs. Registration $1.50. Auction, swap table, YL tour, cooking demonstration, fashion show, DX, equip. displays, closed circuit TV, novice attractions, and more. Talk in 3920, 50.14 and 146.94. For more info contact K0BXF, 3045 North 72nd, Kansas City, Kansas 66109. Cy 9-1128.

Cleveland, Ohio

All day Saturday, April 29, the Indian Hills Radio Club will host Greater Cleveland Area Hams and friends at the Alliance of Poles Hall, 6968 Broadway Ave. (near Fleet and Rt. 21, Willow Freeway). This large hall will allow an all indoor affair with ample space to sit and renew contacts with Cleveland Area Hams. Donation at the door are $1.00 and tickets to an inexpensive buffet dinner at 7:00 P.M. are $2.00. Contact K8SEV, John Williams, 13213 Shaw Ave., Cleveland, Ohio 44112.

Dixon, Illinois

The Rock River Radio Club will hold their first annual spring hamfest April 23, at the Lee County 4-H Center, located one mile east of junction U.S. 30 and 52, near Amboy, Illinois. A cordial invitation is extended to all hams, CBers, electronic hobbyists, and commercial exhibitors. Hours: 9:00 A.M. to 5:00 P.M. Lunch, refreshments, and unlimited parking. Advance ticket donation $1.00—1.50 at the door. For additional information and advance tickets, contact Charles Randall, W9LDU, Dixon, Illinois 61021.

Propagation *[from page 84]*

Southern Brazil, Argentina, Chile & Uruguay	08-12 (1) 12-14 (2) 14-15 (3) 15-16 (2) 16-18 (1)	06-07 (1) 07-09 (2) 09-13 (1) 13-15 (2) 15-17 (4) 17-19 (3) 19-20 (2) 20-21 (1)	02-04 (1) 04-08 (2) 08-15 (1) 15-17 (2) 17-22 (4) 22-00 (3) 00-02 (2)	20-04 (1)
McMurdo Sound, Antarctica	12-17 (1)	11-15 (1) 15-18 (2) 18-20 (1)	00-04 (1) 04-07 (2) 07-16 (1) 16-18 (2) 18-22 (3) 22-00 (2)	02-05 (1)

The Station Within A Station, WFLD *[from page 63]*

and its effects. Opening up on 15 meters, the amateur station received reports of snow depth, road openings and emergency activities from other hams operating from their homes. As WA9RTP's operation was shown on television screens, thousands of viewers had an opportunity to see ham radio as a public service rather than, as some claim, a public nuisance.

Quinlan publicly thanked the hams when he appeared on television. He pointed out that hams had volunteered information about storm activities when no other source of information was available. Quinlan also sent each ham who was logged during the operation a personal letter of thanks for the public service performed.

The Field Amateur Radio club includes more than 25 ham operators from the Chicago area. An adult-age club for OM's only, the roster includes a number of prominent Chicago area business and professional people. Other officers besides Anast, who is an orthopedic surgeon, are: Vice President Dick Cox, K9PGN, who is associated with the business machine field; Treasurer John McHugh, W9AVD, a tax expert for a public utility; and Secretary Bill Bandelin, K9DRK, a school teacher.

Located on the 44th floor of the Kemper Insurance building in downtown Chicago, the club uses what is believed to be the highest ham antennas in the Chicago area—dipoles for 20, 15 and 10 meters at approximately 575 feet above street level. Station equipment, which includes Collins 75S-3B receiver, 32S-3 transmitter, 30L-1 amplifier and 312B-4 station control, is housed in a custom console.

Future plans for the Field Amateur Radio Club include a new site and a more effective antenna system. The club will move its facilities into the new WFLD studio building under construction in Marina City and will install a beam atop one of the twin towers of Marina City, a skyscraper reaching 588 feet above downtown Chicago. ■

Contest Calendar *[from page 77]*

Each station must show 6 hours of continuous rest in each 24 hours. Each log must show a minimum of 6 hours in each 24 hour period.

Awards are many and varied for the first 3 places in the many categories and sections. Last year 16 Trophies were also awarded.

Logs must be postmarked no later than 30 days after the contest and go to: Pete Billon, WA6MWG, 4040 Via Opata, Palos Verdes Estates, Calif. 90274.

Editor's Notes

Now is the time for all the organizations holding contests this Fall to advise me of same. If I receive the information early enough we might be able to avoid duplication in the dates.

73 for now, Frank, W1WY

amchoors a favor and picking up cupple bux for Scratchi at same time.

So, be sure to telling me what you you deciding to do, so I can start working on next project. You see, Scratchi been reel busy last month working lotsa dee-x, and each time I are making recording of QSO.

Are thinking that there are many amchoors that are not being able to working all dee-x they wanting to, so Scratchi going in business of selling tape recordings of rare dee-x contacts to anybuddy that wanting them. All I have to do is dubbing in call of amchoor who buying tape, and then that recording are sounding like the amchoor who buying tape are ackchewally working the rare dee-x stayshun. How about that for reel smarty idea, Hon. Ed?

Or course, I knowing all amchoors are honest, so they not buying any of my tapes to winning contests, or anything like that—but they can have lotsa fun impressing all there friends.

Respectively yours,
Hashafisti Scratchi

Le Chatelier [*from page 71*]

constitute a constraint but when it became clear that the intention was that existing radio amateurs who had passed the examination and code test at the existing grades were liable to lose privileges, especially phone privileges in certain bands, then the constraint became real and earnest.

Then very naturally many people said it was hardly worth while taking the trouble to pass the examination and tests if the privileges gained might well be removed in the near future. It was at this stage that the constraint became obvious, and the system readjusted itself, according to Le Chatelier's theorem, to minimize the effect of this constraint by taking out a C.B. license, this requiring no test or examination.

This surely is a partial explanation of the falling off of new radio amateurs and the increase in the C.B.ers.

It is no part of this article to discuss the merits or otherwise of C.B.ers or of incentive licensing, but it may well be a good thing to have separated those who are keen enough to pursue the higher grades with the privileges attached, from those who have either not got the ability or the willingness to undertake the higher tests. This may be a satisfactory arrangement.

As was mentioned above, the object of this article, however, it not to discuss the merits and demerits but to explain the logical sequence of making available a Band of frequencies to C.B.ers without examination; while at the same time proposing stiffer tests for the amateurs and possibly depriving the existing grades of certain of their existing privileges. What is surprising is that this perfectly logical sequence was not foreseen and that there is still, therefore, so much discussion of it. ■

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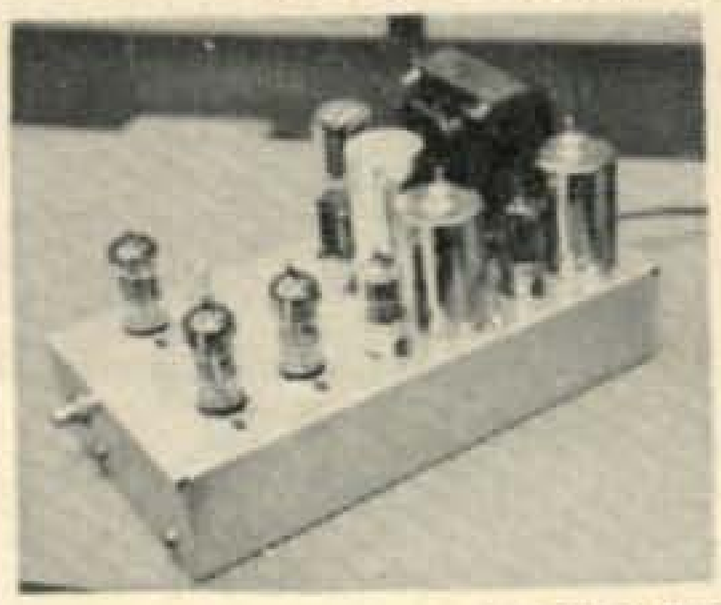

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Waters Dummy Load [*from page 57*]

order to maintain a constant impedance and a low s.w.r. up into the u.h.f. range, there is no insulation around the center pin.

In order to conveniently approximate the accuracy of the wattmeter, on the rear panel is stamped the reading that should be indicated on the 50-watt scale when 120 v. of 60 c.p.s. a.c. is applied. This setup also is designed to indicate if the meter is functioning properly.

The size of the instrument is 9″ × 4¾″ × 10¼″ (H.W.D.) and it weighs 12 pounds.

Model 384

The Model 384, which is a dummy load only and thus does not include the wattmeter setup, is otherwise constructed in the same manner as described for the Model 374. A push-button on the panel provides a test facility for the warning lamp which is behind a 1″ diameter red-colored lens. The s.w.r. and power ratings are the same as for the Model 374.

Installation and Operation

When either of the units is being connected, care must be exercised not to place any undue strain at the load connector that might bend the center pin, because of the lack of a lateral support from a center insulator. A line cord from the instrument must be plugged into a power-line outlet to provide voltage for the warning lamp and after this is done, the lamp should be checked using the test facility.

As is always a good practice when a meter is used for measurements, it is suggested that with the Model 374 the range selector should first be set for the highest range and then switched to a lower one as need is dictated by the power reading.

Where it is necessary to determine the power level when the Model 384 dummy load is in use, it can be done by inserting a directional wattmeter, such as the Waters Model 369 Reflectometer, in the transmission line.

An alternate method would be the measurement of the r.f. voltage across the load and converting to watts by $P = E^2 \div R$. To do this, use a T-adapter (Amphenol 83-1T) at the load with the coax cable connected to one arm of the T, and the r.f meter to the opposite arm. The meter should be a low-capacitance probe-type capable of handling the expected r.f. voltage. Typical voltages with a 52-ohm load are: 51, 72, 112, 162, 228 and 260 volts r.m.s. for 50, 100, 250, 500, 1000 and 1500 watts respectively. Solid-state diode-type probes are thus ruled out for use above 50-watt levels.

Performance

The power readings using the Model 374 were found to be within the stated accuracy for 2-30 mc operation. At higher frequencies the readings tend to drop off. The meter movement is fairly well damped, so the pointer may not swing as high as expected when you're observing a voice-modulated s.s.b. signal. With both models the s.w.r. was found to be within the ratings up to 230 mc.

The thermal switch operates at a temperature of 220° F., so when the top screws at the rear of the case get quite hot to the touch, you can approximate the approach of the maximum allowable temperature.

Although some uses for these instruments may be somewhat obvious, we'd like to point out their more common applications, such as determining the power-output capabilities of a transmitter; checking or adjusting s.w.r. bridges or directional wattmeters; finding proper tuning and loading settings of r.f. amplifiers on 52-ohm loads; tuning up a p.a. without radiating a signal; checking power loss in coax cable or high-power attenuators. If the insertion loss of a low-pass filter is known, you can also check the total harmonic content of the signal by noting the difference in the power readings with and without the filter installed.

The Waters Model 374 Dummy Load/Wattmeter is priced at $135.00, the Model 384 Dummy Load is $65.00. The original Model 334, designed for indicating r.f. power to 1000 watts at 2-230 mc, is still available. These are products of Waters Manufacturing, Inc., Boston Post Road, Wayland, Mass. 01778. —*W2AEF*

DX [*from page 74*]

DXers, writes that despite information to the contrary published in the *Radio Amateur's Callbook Magazine* the VERON QSL Bureau is still the official IARU QSL Bureau for Holland. He further states that it has had this status since 1924. The second bureau is operated by VRZA, described by PA0LOU as a minority group which broke away from VERON. He says that VERON represents 1200 of the 1600 licensed PA0 amateurs, and that it's bureau provides much faster service than the VRZA bureau. The address of the VERON bureau is P.O. Box 400, Rotterdam, The Netherlands.

Interesting Countries and Prefixes Heard From

AP2 Pakistan—AP2NMK is said to be legitimate. The operator is AP2SG and he is set up at a boy scout jamboree similar to ST2BSS. Listen around 14180 kc at 1400 GMT.

FB8 Crozet Island—FB8WW is frequently found between 14005 and 14050 kc after 1300 GMT.

FM7 Martinique—W4OPM has regular skeds with FM7WQ. Drop him a line enclosing a self-addressed postcard and he will be happy to schedule you a contact.

FO8 Clipperton—A trip to this one is being planned by Don Simonsen, K7GHZ. The tentative date is May, 1967. DXers who are also good sailors are being sought as participants.

KP4YT reports via the *Puerto Rican DXer* that the French have installed a weather station here and that there are several permanent residents including a TI operator. Unfortunately the latter is reputed not to be DX-minded.

FR7 Tromelin—FR7ZL is a new station on the island. He is running 150 watts to a dipole and expects to be there for about a year. His frequencies are 14109, 14114, and 14120 kc crystal controlled. He is not a contest style operator.

FY7 French Guiana—Bad news for those QRZ for FY7YL cards. The word from Jean-Pierre and Monique, FG7XL, his QSL managers, is that no logs have ever been received from him despite persistent inquiries and consequently no cards can be sent out.

HK0 Malpelo—K4CAH and other prominent SW Florida DXers are rumored to be heading for this rare spot in the near future.

JT1 Mongolia—For those interested in Zone 23 JT1KAA is reported active around 14025—14040 kc c.w. Remember there are also a few UA0 stations in Tanna Tuva which count for Zone 23.

JX5 Jan Mayen—Activity reported around 14065-14075 kc mornings around 1100 GMT.

MP4 Qatar—VS9ARV is planning a trip soon and will use the call MP4QBJ. OD5EL now holds the call MP4QBU and hopes to go there with OD5BZ in the near future, possibly early April.

PA-PJ Reciprocal Licensing—Now in effect between USA and Netherlands-Netherlands Antilles. Apply to Post Office Administration, 12 Kortenaerkade, The Hague.

SV0 Crete—K4FUV is now active as SV0WFF on 15 & 20 meter c.w., a.m., & s.s.b. SV0WL is also active on 28600 kc and 14190-14210 kc.

TA Turkey—TA2AC has been reported on 14018 kc c.w.

TJ8 Cameroun—Herman, HK1QQ/TJ8 is active now and should have a regular TJ8 call by the time you read this. In addition he plans DXpeditions to several rare W. African countries on the following *tentative* schedules:

TL8—March
TT8—April
TN8—May
TR8—June
5U7—July

TT8 Chad—Serge, TT8BW, has been reported on 21,355 kc a.m. fone at 1900 GMT.

VK2 Lord Howe Island—A trip is in the works for May 5-15 by VK2EX and VK2AVA. They plan to operate both s.s.b. and c.w. on all bands 10-40 meters, split frequency. The call will be VK2AVA/P.

VK7 Tasmania—VK7SM, Sam, is frequently heard on 7005-10 kc after 1000 GMT, especially weekends.

VR5 Tonga Island—VR5PK has been reported around 7.0 Mc CW at 1100 GMT listening on 7.002-7.005.

VS5 Brunei—VS5MH will be on 14290 kc Wednesday mornings for a 1230 GMT sked. *After* his sked he will work W,K's.

VS6 Hong Kong—VS6FS, Tony, is reported on 14151 kc s.s.b. at 1455 GMT via the short path.

YK1 Syria—YK1AA: It is rumored that Rasheed's license may not be renewed when it expires in a few months so you best work him while you can. This one could get very rare.

ZA Albania—I1RBJ advised that he was NOT in Albania during December, 1966. When he goes there he assures us that it will be well publicized in advance.

ZD3 Gambia—ZD3G, Ray, is very active on 20 and 40 meter s.s.b. ZD3E, Charles, is occasionally active on 10 meter a.m. fone between 1600 and 1900 GMT. A new station, ZD3F, may be active by the time you read this.

ZL1 Kermadec—ZL1AI is active on a.m. fone and hopes to get on s.s.b. soon.

3Y Bouvet—No known activity planned at this time, but new prefix is 3Y.

4S7 Ceylon—4S7NE, Nelson, heard peaking S8 in Florida via the long path in February. He was using low power to a dipole only 35 feet up.

5R8 Madagascar—5R8AS, Chet, has been heard between 14120 and 14160 kc s.s.b. at 1400 and 1900 GMT.

5VZ8 Togo—5VZ8RG is frequently on 14155 kc s.s.b. between 2200 and 2300 GMT.

9G1 Ghana et al—9G1EZ is planning trips to XT, 5V, TZ, and TU.

9N1 Nepal—9N1BG operates transceive on 14198-14205 kc at around 1200-1230 GMT.

QSL Information

CR5SP—via W2GHK
EA9EJ—Justo B. Teru, Nuvos-Pabellones-22, Villa Cisneros, Rio de Oro, West Africa, via Spain
EP2ML—via GI3HXV
HK1QQ/TJ8—via W4DQS
KC4USM—via K1TWK
PA, PE, PI *(Netherlands QSL Bureau)*—via VERON, P.O. Box 400, Rotterdam.
PJ5BC—via K0GTN
SV0WL—Lt. W. L. Corbin, U.S.A.F., Box 735, 6931st. Security Group, APO N.Y. 09291
TI9JIC & TI9JH—P.O. Box 2412, San Jose, Costa Rica
VK2BRJ/9—via W4ECI
VK3AHI/VK9—via VK3ACW
VK0CR—Greg Johnston, 3 Inglis St., Newtown, Tasmania
VP8HO—via K6GMA
VS5MH—via W1DGJ
VS6FS—P.O. Box 22, Hong Kong
VS9HRV—W/K QSLs go to W9ARV, Box 7, Peru, Ill. 61351
VU2WNV—via W4ECI
YASME—P.O. Box 2025, Castro Valley, Calif. 94546
ZD3G—via K6ENX
ZK1AR—via K4SHB
3W8D—Russell Milroy, c/o RMK-BRG 340, APO 96312, San Francisco
5R8AS—via W6ZPC
5VZ8RQ—P.O. Box 11, Palime, Republic of Togo, West Africa
8R1G—via WA4UOE
9M2DQ—James C. Pershouse, c/o Henrietta Estate, Padang Serai, Kedah, Malaysia
9N1BG—via VE4OX ■

Swan 350 [*from page 48*]

and a jumper wire to pin 2. Run a wire from pin 2 to the relay arm lug, then from relay contact point lug to ground. Then run a wire from relay arm lug to one terminal of the s.p.s.t. switch. Run a wire from the other side of switch to ground. Now run two wires from relay coil to the coil lugs of K_2, the relay in the 350.

After doing these steps you will find that whether the toggle switch is in S.S.B. or A.M. reception your carrier osc tube (V_{14}) will be turned on automatically when transmitting. This conversion does not in any way harm the Swan 350 and will improve a.m. reception considerably. ■

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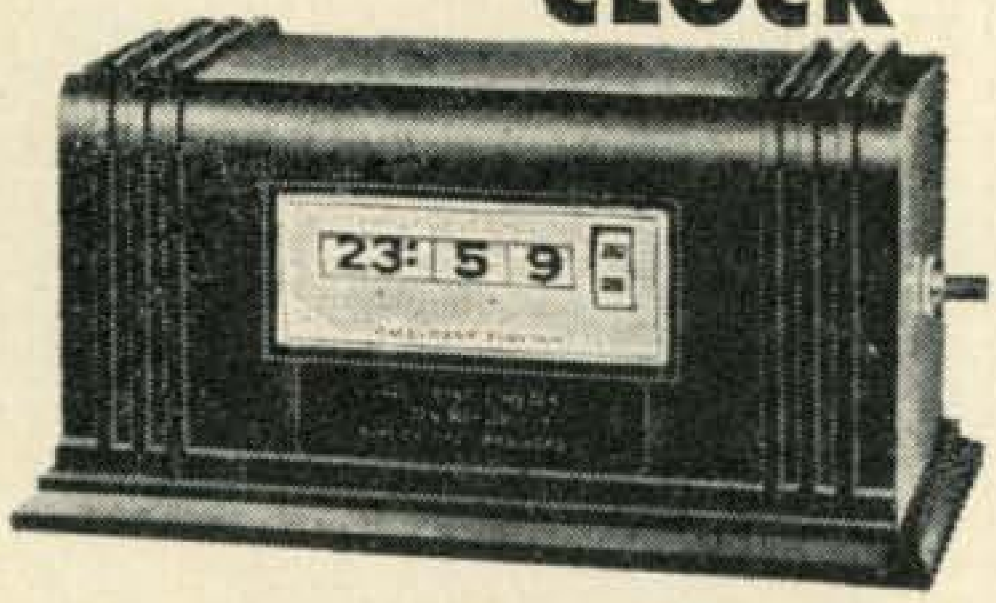

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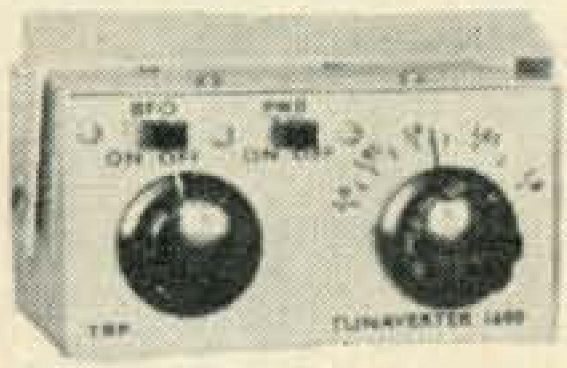

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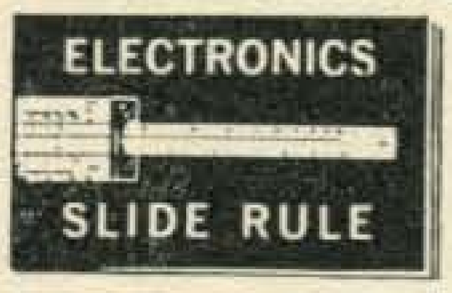

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Ham Operator [*from page 44*]

Goodwill," about 50 BPLs and a Medallion, and ARPSC Achievement Award. She is an A-1 Op and has been named Operator of the Month. Bea belongs to Navy MARS with the call N0REH. She has been active with YLRL (2nd District Chairman for two years), NYC YLRL (vice president), OPS, RACES, AREC, Asst. Mgr. of the Mike Farad Emergency & Traffic Net, Asst. Mgr. of the NYC-LI VHF Traffic Net, NCS of the All Service Net, NCS of the North American SSB Net. She holds WAS, RCC, YLCC (250+) and recently became interested in CHC/FHC.

All of this started for Bea when her son brought home an old table-top Marconi radio which didn't work. She asked him to get rid of it as she couldn't get sound out of it and it was just a dust collector. He said, "Mom, I didn't spend a year in tanks for nothing; give me ten minutes." He took a wire coat hanger, wrapped wire around it, nailed it up on the edge of the roof, attached it to the "junk," and Bea found a new world! From then on she listened daily until she realized she just had to get a good receiver. The OM bought her one, she obtained manuals, learned the code and built her own oscillator from a battery and doorbell buzzer. She still didn't know a ham, but when she thought she was ready for the test she called K2YSK, Frank, whom she could hear almost every day. He told her how to get ready for the Novice test, and a year later with coaching from Frank and his friends she had her General.

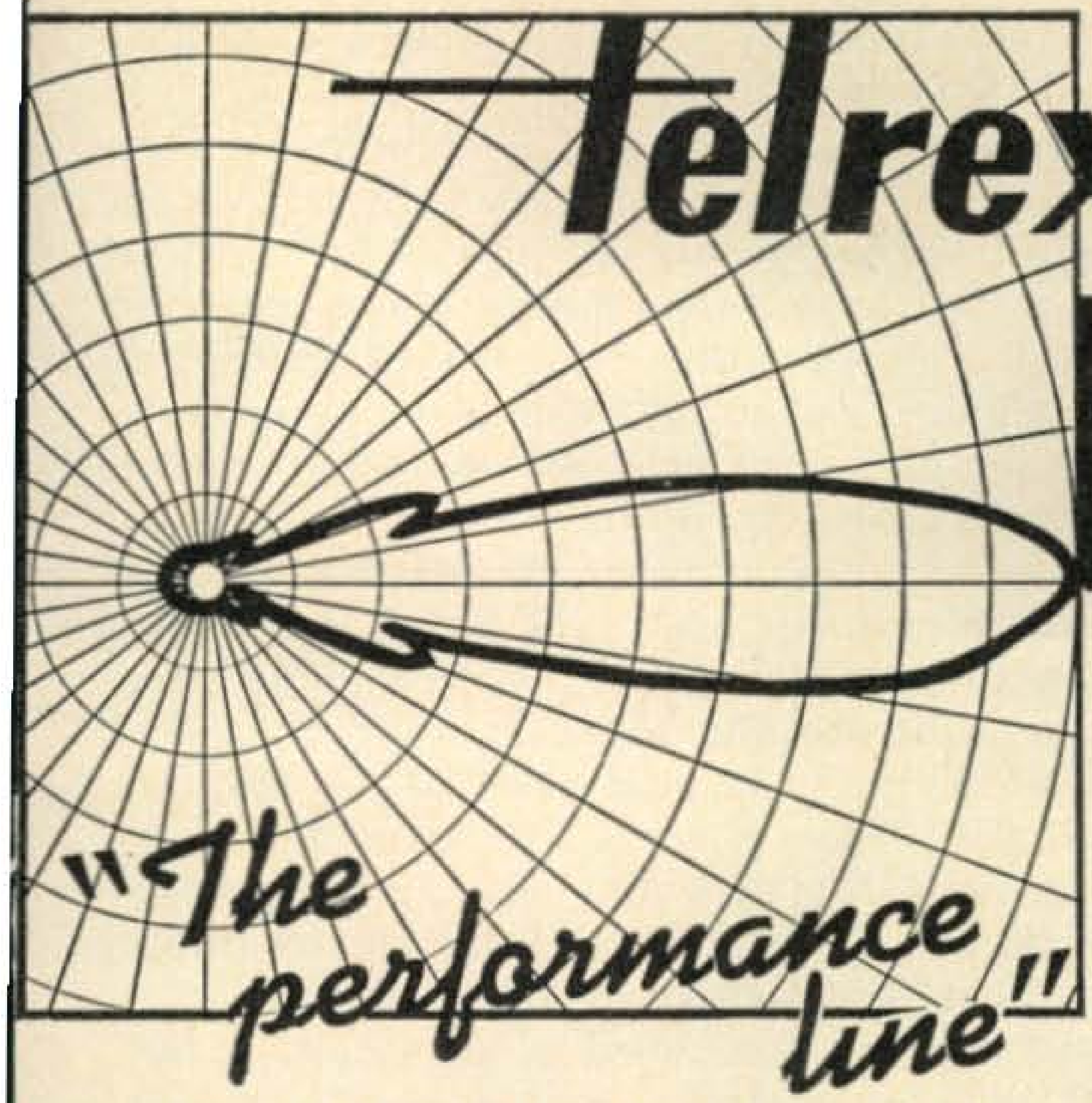
Besides son Steve, Bea and her OM Harry (who is not a ham) have a daughter Suzanne and they are proud grandparents. When the children were growing up Bea was thoroughly involved in PTA, Temple and other community work. With ham radio she finds great opportunity for continued service, not just in the community, but worldwide.

Congrats, Bea, WA2GPT, and as the Scouts say, "Let's give her a great big HOW!" ■

Grumbles [*from page 28*]

I once spent well over $100 for a kit which was supposed to end up as a receiver. One of the final steps was installing (rather permanently) a celluloid tuning dial. Fine and dandy, except that I discovered there was *one* more step; it required me to make a solder connection beneath the celluloid dial—something which might just as well been called for 15 steps earlier. It wasn't though, and I was greeted with the spectre of a horrendous black rimmed hole rapidly expanding in the celluloid as I brought my soldering gun near. Acrid grey smoke rushing out at me, I had to stumble and choke my way to the window, knocking over scopes, cuspidors and assorted vistitors.

When I had occasion to question the manufacturer about this, his reply was, "Funny, we haven't had any other complaints about that." No wonder, everyone who attempted to build



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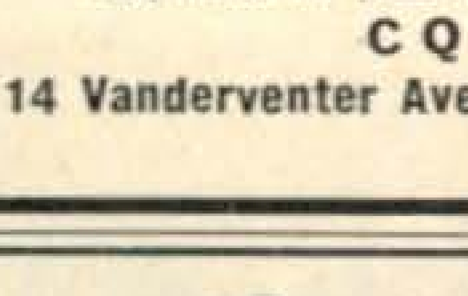

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this winner probably ended up either a silent key or addicted to the fumes.

I grade each kit with a "CF" (confusion factor) rating. This is an arbitrary scale from 1 to 10 which takes into account things such as too few or too many parts, poorly conceived construction information, unexplained parts or chassis holes, and so on. A great many projects never get anywhere near the maximum rating for good kits—a CF-10; most of the better ones get to an 8 or 9. You might consider rating some of your kit efforts thusly and letting me know; I'll try to get the *CQ* gang to pass along your ratings to the manufacturers.

Don't forget to include some of the features which you liked or didn't like about the piece of gear itself. Maybe, with your help, we can embark on a campaign to get some of the things we've always wanted from manufacturers.

One wonders how some of the gems we see (both kits and wired) ever make their way through the various stages of planning, design, development, and eventual (attempted) sale. Some things which might be desirable are usually lacking (things like a provision for monitoring your own c.w. signal), and we often find some meaningless window-dressing junk which only adds to the cost.

We really shouldn't have to *force* this type of information down the gullets of manufacturers, they should be out pounding on our doors begging it from us. I once asked a leading manufacturer's rep about why they didn't keep a constant poll of consumer opinions going. He replied that it would make the hams think that the manufacturer had no ideas of his own and didn't know what he was doing. I recall that several years ago National ran an idea contest and the end result was the NC-300, a real charmer of a receiver. It was comprised of the dreams of thousands of hams and really sold up a storm for National.

As I was saying to Willie on 20 the other day," When I'm in a position to say what goes around here, thing's will be different." Haven't you ever said that?

Keep the faith, Bunky!

73, Sam

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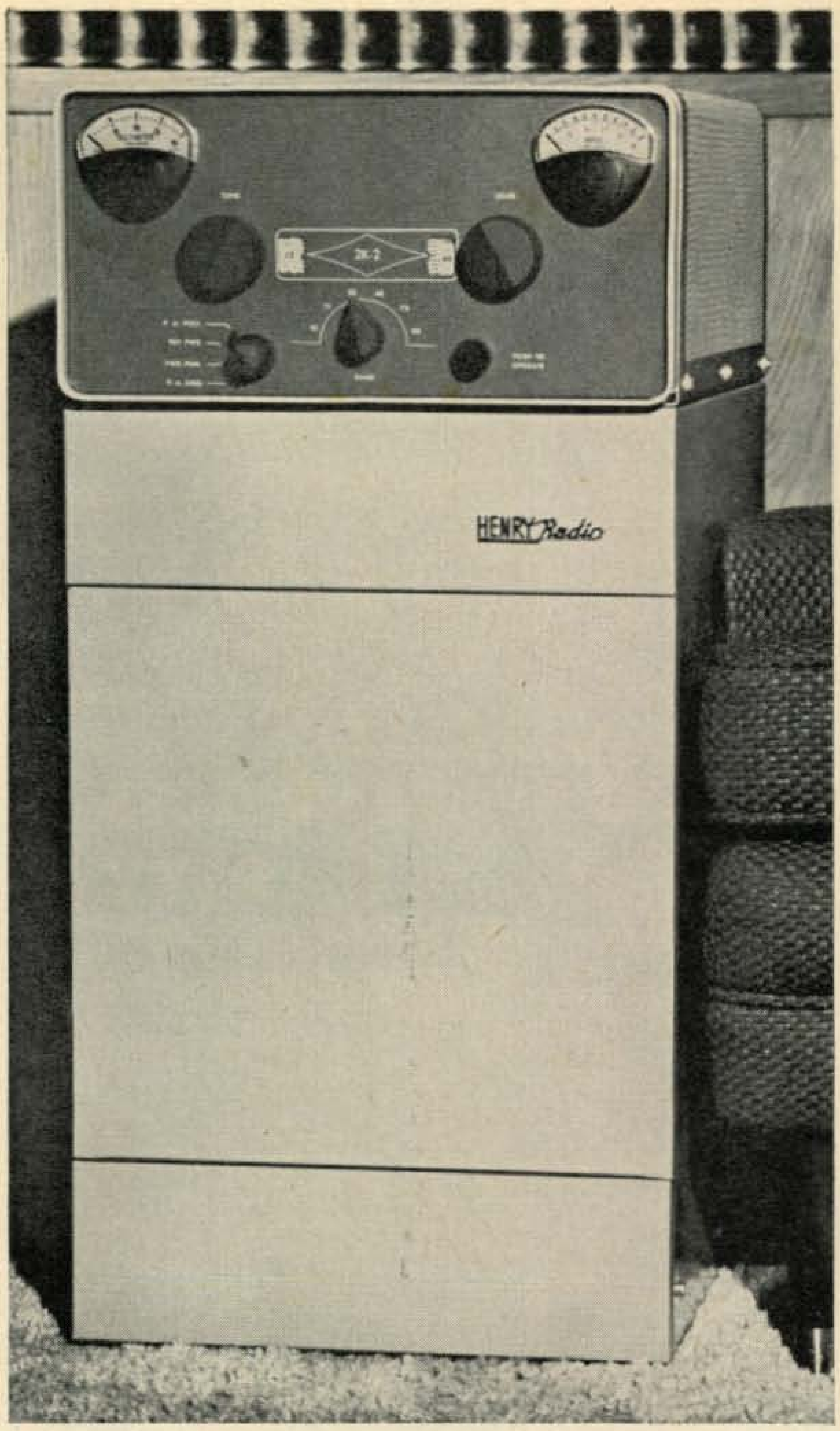

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Employs seven transistors and four diodes and is designed to copy standard 850 Hz FSK. The input impedence is 600 ohms and the unit will work reliably with an input signal as low as 50 mv. from a communications receiver or AFSK. Provisions have been made for oscilloscope connections. Complete kit with pretuned filters and connector. TU-MK $21.95
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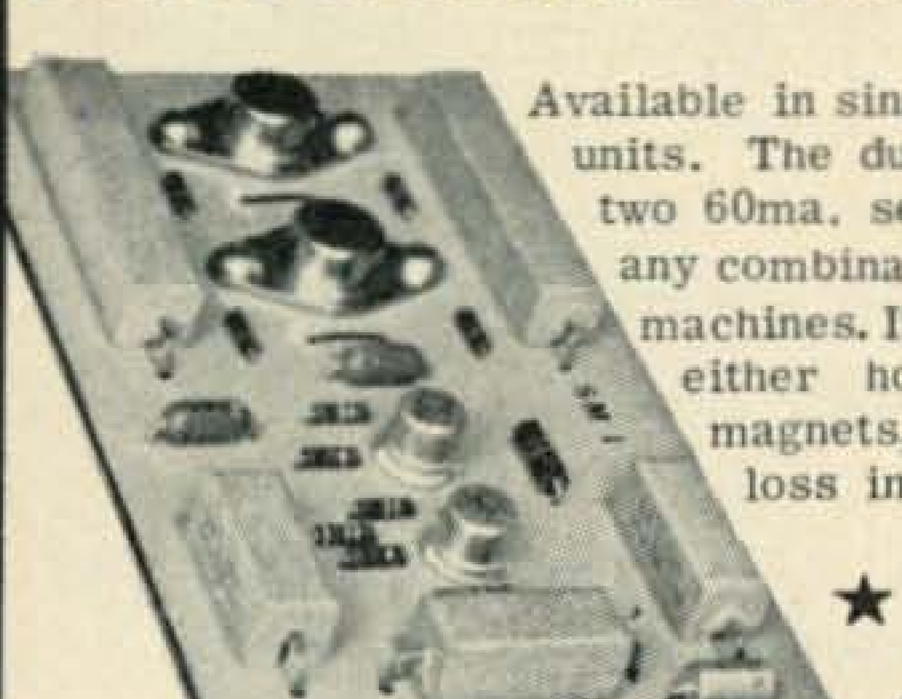

Available in single or dual driver units. The dual unit will drive two 60ma. selector magnets or any combination of 60 or 20 ma. machines. It will function with either holding or pulling magnets, with little or no loss in range.

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For further information, check number 30, on page 110

Ham Shop

ADVERTISING RATES: Commercial and organization ads, **35¢** per word. Non-commercial ads for other than subscribers **10¢** per word, including abbreviations and addresses. **Minimum Charge $1.00.** No ad will be printed unless accompanied by full remittance. Current CQ subscribers must send mailing label from CQ wrapper in lieu of cash payment.

Closing Date: The **5th** day of the second month preceding date of publication.

Because the advertisers and equipment contained in Ham Shop have not been investigated, the publishers of **CQ** cannot vouch for the merchandise listed therein. We reserve the right to reject advertising which we feel is objectionable.

Direct all correspondence and copy to: **CQ HAM SHOP, 14 Vanderventer Avenue, Port Washington, L.I.N.Y. 11050.**

"**HOSS-Trader**—Ed Moory; Offers opened and displayed Equipment, with Factory Warranty only 2 each at this Price. Swan Mark-1 Linear, $389.00; Swan 350, $339.95; NCX-5, $449.00; NCL-2000, $539.00; Swan 500, $419.00; Galaxie 5 Mark-II, $349.00; SB-34, $349.00; Demo-Ham-M, $96.95; New Classic 33 & Demo-Ham-M, $219.00; Demo Drake TR-4, $489.00; T4-X, $349.00; R4-A, $354.00; Package Deal; New Galaxie 5 & A.C. Supply, $419.00; Package Deal, New NC-200 & A.C. Supply Regular Price, $400.00 SPECIAL, $359.00. Reconditioned Gear; Swan 240, $159.00; Drake 2-A, $149.00; DX-100, $69.00, B & W 5100, $69.00; 75S-3-B, $429.00; 32S-33, $519.00; 30L-1, $389.00; TR-3, $379.00; Used Ham-M, $85.00; KWM-2, $699.00. Ed Moory Wholesale Radio Co., Box 506, DeWitt, Arkansas, Phone Area Code (501) 946-2820.

POLICE-fire-aircraft-marine-amateur calls on your broadcast radio with TUNAVERTER! Tune the band! Economical! Guaranteed! Free catalog! Salch Company, Woodsboro, 4C Texas 78393.

RADARS Wanted: Radar equipment of all kinds bought. Write: M. Cemprola, 550 Fifth Avenue, New York, New York 10036.

WANTED: Military, Commercial, SURPLUS, Airborne, Ground, Transmitters, Receivers, testsets, accessories. Especially Collins. We pay cash and freight. RITCO, Box 156, Annadale, Virginia, (703-560-5480 COLLECT).

RECEIVING & Industrial tubes, transistors, all brands—Biggest discounts, technicians, hobbyists, experimenters—Request Free giant catalog and save! ZALYTRON, 469-Q, Jericho Turnpike, Mineola, N.Y. 11501.

RTTY gear for sale. Write for list issued monthly. 88 or 44 Mhy toroids, five for $1.75, postpaid. Elliott Buchanan and Associates, Inc., Oakland, Calif. 94610.

NEW SCIENTIFIC INSTRUMENT detects buried gold, silver, coins, treasures, war relics. $19.95 up. Free catalog. Relco-B22, Box 10563, Houston, Texas 77018.

SAVE on all new or used Ham gear. Call or write BOB GRIMES, 89 Aspen Road, Swampscott, Mass. 617-598-9700.

GOVERNMENT surplus picture catalog 25¢. Meshna, Nahant, Mass. 01908.

4-used 200 foot F.M. TV towers. Dismantled and ready for shipment. Blaw-Know model N16. Plans available. FAA hazard painted. Will sell one or more. For additional information contact Owen J. McGarrahan Co., 16 Pelham St., Cambridge, Mass. 02142. Phone area code 617-547-3250.

NOVICE Crystals, all band, $1.30 each. Free list. Nat Stinnette, Umatilla, Fla. 32784.

QSL's BROWNIE WCCJI . . . 3111 Lehigh, Allentown, Pa. Samples 10¢, with catalogue 25¢.

HUNDRED QSL's $1.00. Samples, dime. Holland, R3, Box 649, Duluth, Minnesota 55803.

PLASTIC Holders each display 20 QSL cards. 3 for $1.00 or 10 for $3.00 prepaid and guaranteed. Free brochure of other Ham Goodies included. TEPABCO, Box 198Q, Gallatin, Tennessee 37066.

THREE Line Rubber Stamp $1.00, four lines $1.25, knob handle, postpaid. Chief's Stamp Shop, Maynard, Arkansas 72444.

FOR SALE: Gonset G S B 100, $105. P/S 1800 volts, $25. Gonset super 12 converter $25. Tecraft 6 meter transmitter $25. R. Velazquez, WA2YDH, 34-36 64th St., Woodside, N.Y. 11377.

SELL: Collins 310B cw exciter with PTO, homebrew 100 watt amp-modulator. Sell separately or together. P. Rubinfeld, WB2JNS, 97 Mountainview Rd., Millburn, N.J. 07041.

HAVE lots of Ham Radio parts and components would like to swap them for Lincoln Head pennies or what have you. Pennies prior to 1935. R. G. Wilson, W3GHD, 139 Campbell Ave., Havertown, Pa. 19083.

$5.00 for manual and schematic for Rex Bassett GC-75. Will return after photographing if requested. Ed McCormick, W5MRZ, P.O. Box 36, Wynne, Arkansas 72396.

FOR SALE: 61 Ft. Vesto Tower. $150. *Can't ship. Ted Harvey,* W2CTE, 21 Ramapo Ave., Suffern, N.Y. 10901.

HEATH MARAUDER & 75A3 for sale. David Sachs, WB2VZM, 2279 East 22nd St., Brooklyn, N.Y. 11229.

FREE CATALOG: Electronic parts, tubes, wholesale. Thousands of items. Unbeatable prices. Areturus Electronics Corp., 502 22nd Street, Union City, New Jersey 07087.

GREAT BUYS: Catalog 10¢. Electronic, Electro-Mechanical Bargains, VHF-TX assembly $13.95. Fertik's 5249 "D," Philadelphia, Pa. 19120.

TECHNICAL Manuals Electronics Signal Corp. etc. 16 page catalog 25¢. Quaker Electronics, Hunlock Creek, Pa. 18621.

LOW-COST loans by mail. $6.00 monthly repays $104.50; $56.00 monthly repays $1,321.39. Borrow any amount. Guaranteed fast, confidential. Write today! Bankers Investment 72-A, Box 1648, Hutchinson, Kansas 67501.

QSL's by RUTGERS VARI-TYPING SERVICE, Thomas Street, Milford, N.J. 08848. Free Samples.

YOU NEED IT, we got it! Unheard of bargains in Coaxial Cable, Switching Equipment, Meters, Relays, Connectors, Capacitors, Transformers, etc. Phone or visit! Open Monday-Saturday till 5 P.M. Windsor Distributors, 46 Fulton Street, Brooklyn, New York 11201, Phone 212 MA4-7038.

FOR SALE: HT-37 ($200) and HT-41 ($175). Both in excellent condition. SX-99 with Heath Q-Multiplier, good novice rcvr, $50. K4IIF, Box 205, Winter Haven, Florida 33881.

COMPLETE STATION: Collins 32V3, Filter, Relay, P.T.T. D104 Mike, Phone Patch, HQ129X Recvr, Xtal Calib., Spkr. Like new, hardly used. F.O.B. firm $295. Ant. only needed! Monroe M. Freedman, W2ASI, 15 Kensington Oval, Isle of Sans Souci, Davenport Neck, New Rochelle, N.Y. 10805.

MODEL 19 Teletype cover with doghouse and tape reel. $10.00 or swap. Will answer letters if you send stamp. No postcards. J. Thomsen, W9YVP, 11001 South Pulaski, Chicago, Illinois 60655.

TWO METER Station: SCR 522, matching power supply & extra tubes, Tecraft CC-144 converter (14 mcs IF), 8 element beam. $60. package. D. E. Logan Jr., WB2FBF, 21 Judith St. Nanuet, N.Y. 10954.

TWO'ER with 12 VDC supply, halo, 5-element beam. Will deliver within 50 miles. $55. cash. K0FPC, R. V. Davis, 1005 So. Lexington, Harrisonville, Missouri 64701.

NEEDED one Collins Mechanical filter F-455J-21 (2.1kc) for Collins 75A4. Harry M. Riddle, W8EDL, 2661 Northwood Ave., Toledo, Ohio 43606.

SELL RDO rec. with manuals $100. covers 40 to 100 mcs. described in Oct. and Nov. CQ, good condition. Frank Kedl, W7CRP, 55 E. 8th St., Sheridan, Wyoming, 82801.

WANTED: New or like new A4-22 Control unit part #ACU-83. Give full particulars. J. L. Rigau, W4QGW, Box 685, Gloucester, Va. 23061.

RCA-5820 image orthicon, used only 40 hours; make offer. Want ATV gear, Vidicons, 432 MC gear. R. E. Beatie, 1904 E. 114 Ave., Tampa, Fla. 33612.

BEGINNER wants SWL, REC, VTVM, RF sig. gen., scope, Heath Edu-kits, EF1, EF2, EF3, orig. owner late models. Cash or photo equip. Allan A. Sonsky 191 East 17th St., Brooklyn, N.Y. 11226.

FOR SALE: Heath HG-10 VFO excellent condition, and Knight R-55. Best offer. G. J. Cotellis, Jr., WA4RGD, 1903 32nd Street, West, Bradenton, Fla. 33505.

WANTED: Early vacuum tubes for my private antique wireless museum. Need DeForest spherical "Audion" with candelabra screw base, UV203, etc. R. W. Schnedorf, W9LJH, 610 Monroe Ave., River Forest, Ill. 60305.

FOR SALE: Collins KW-1 transmitter. 1,000 watts phone or C.W. In fine condition. $1,000.00 F.O.B. Athens, Georgia. George F. Norton, W4EEE, Georgia University Station, Athens, Georgia 30601.

SENECA 6 & 2 meter, very clean, unmodified 2 years old, $135. or swap for other gear. Joe H. Owings, K0AHD, 10217 St. Daniel Ln. St. Ann, Mo. 63074.

HA-1 TO KEYER. Excellent condition. $45.00 postpaid. J. R. Belt, WA0JIH, 1206 Main St., Parkville, Mo. 64152.

NEW Triplett 221T meters 100 mils and 1000 mils $6. each B&W 426 72 ohm LP filter $10. B&W CC50 dipole connector with RG59U attached $2. G. L. Countryman, W4JA, 75 E. Bay St., Charleston, South Carolina 29401.

FOR SALE: Radio News, CQ, QST, RSGB and callbooks. Write for list. 15 cents per copy plus postage. John M. Sulak, W8UMR, R.D. 2, Box 109, Wellsburg, W. Va. 26070.

WANTED BC221 or LM Freq. meter with original cal. book, R11A, R23 or BC453. State price, Weight, and condition. L. Wuertz, 517 Camp St., Sandusky, Ohio 44870.

METERS 3½ Weston round 0-50; 0-75; 0-80, $3.50 each P.P. QST, CQ, Western Radio Amateur, Electronics 1935-1938: Bill Hayward, W0PEM, 3408 Monterey Street, St. Joseph, Mo. 64507.

SELL or TRADE plus cash 250-23-3 Matchbox/coupler, Duomatic keyer, D-104 and stand. Need 30L-1, 312B-4, SM-1 or SM-2, 200 and 500 cycle 32S3 filters, Superex Fones. Henry Taylor, K7NHG, Star Route, Olga, Wash. 98279.

B&W 5100 and 51SB for sale. WA5CMC, C. Ludlam, 2309 Bullington St., Wichita Falls, Texas 76301.

WANTED: B&W 1 kw grounded grid linear L-1000-A, L-1001-A or LPA-1. George F. Marts, W0TDH, 4201 Colvin Drive, St. Louis, Mo. 63123.

FREE!

Ham Shop Ads

Beginning with the March issue, CQ will offer a new free service, on a trial basis, to its subscribers. What's the deal? Simply this: If you are a regular subscriber to CQ, you will be offered a FREE Ham Shop ad in the very next available issue of CQ, and *every* issue during the duration of your subscription! No strings attached! It's just one more little way we feel we can better serve our regular readers.

How does it work? Just type or print your ad, (limit: 3 lines or about 150 characters), on a sheet of plain paper, attach your mailing label from your latest issue of CQ, and mail in an envelope to:

FREE Hamshop Ads
CQ, The Radio Amateur's Journal
14 Vanderventer Avenue
Port Washington, L.I., N.Y. 11050

That's all there is to it.

A few logical limits have to be imposed: Due to space limitations, only six columns per month can be allocated to the New Free Ham Shop, so ads must be run on a first-come, first-served basis. Postmark will be the determining factor. If, because of late arrival, your ad can't make a given issue, it gets first preference for the very next issue, but still you'll want to get your ad in early. Only one ad per subscriber per issue. Your mailing label is an absolute **must;** no label, no free ad.

June CQ is the next issue you can make. Deadline is April 5. Mail your ad today.

No ads from commercial enterprises, please. This service is designed to aid the cash-tight **amateur** only!

The publisher reserves the right to refuse any ad he feels is unfairly deceptive or unsuitable for an amateur magazine. He also reserves the right to withdraw this offer without notice.

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For further information, check number 31, on page 110

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QSL's . . . 30 samples 10¢ . . . Filmcrafters-x . . . Martins Ferry, Ohio.

ZIP CODE directory $1.25. Lutchkus, P.O.B. 213, Carlisle, Pa. 17013.

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VACUUM Variable capacitors, Jennings UCS, 10-300MMFD, 7.5KV, complete with gear drive train, mounting bracket, brand new, $27.50 postpaid-insured. Supply limited, satisfaction guaranteed. Bill Slep Company, Drawer 178CQ, Ellenton, Florida 33532, Phone (813) 722-1843.

HOBBYISTS, EXPERIMENTERS, AMATEUR SCIENTISTS, STUDENTS. . . . Construction plans-all complete including drawings, schematics, parts lists, prices, parts sources . . . LASER-build your own coherent light optical laser. Operates in the pulsed mode, in the visible light range—$6.00 . . . DIODE LASER-Invisible light (infrared) can be continuously modulated—$3.00 . . . REVERBERATOR (Echo) Unit-build your own. Use with your automobile radio, home radio or hi-fi, electric guitar, etc. $3.00 . . . RADAR-build your own ultrasonic doppler radar. Detect motion of people, automobiles, even falling rain drops. Transistorized, uses standard small 9-volt battery—$4.00 . . . LONG RANGE "Sound Telescope"—this amazing device can enable you to hear conversations, birds and animals, other sounds hundreds of feet away. Very directional. Transistorized. Uses 9 V. battery—$3.00, or send 25¢ coin or stamps for complete catalog . . . TECHNICAL WRITERS GROUP, Box 5501, State College Station,, Raleigh, N.C. 27607.

FOR SALE—HT-32 clean, SB-200, 2 months old, Drake 2B & **1,000** gummed address labels, 50¢, 3 sets, same or different name $1.25. Mart's, Box 454, Mackinaw, Illinois 61755.

VOTE! VOTE! Vote! Hams—National Incentive Licensing Poll! Vote for or against, signing your call and handle on a QSL or postcard Now! Results of this poll will be petitioned to FCC and announced soon as possible. Spread the word—fast to Vote! Rush your vote to: SCCARC—WB2NOD—Department CQ, Box 685, Moravia, New York 13118.

DAYTON Hamvention April 15, 1967—Dayton Amateur Radio Association's 16th annual Hamvention, Wampler Arena Center, Dayton, Ohio. Participate in the technical sessions, forums, banquet and hidden transmitter hunt. Bring XYL for best in women's activities. For information write Dayton Hamvention, Department A, Box 44, Dayton, Ohio 45401.

QSL'S Samples 10¢. N & S Print, Box 11184, Phoenix, Arizona 85017.

WANTED—QST's—Last four issues needed to complete private collection. 1916—FEB., MAY, JUNE, JULY. Any reasonable price paid. K2EEK, CQ Magazine, 14 Vanderventer Ave., Port Washington, L.I., New York 11050.

WANTED: Silver Dollars any date. Must see actual coin before I can make a firm offer. If interested in making a profit on your dollars send your silver dollars to me by insured mail. I will return any and all postage even if we can not come to terms. Coins not accepted will be returned immediately by insured mail. Send to HAM SHOP, c/o CQ MAGAZINE, Box CESR, 14 Vanderventer Avenue, Port Washington, L.I., N.Y. 11050.

HOT-SHOT CARD. Designed for clubs and individuals engaged in emergency communication, this 4" by 5" red card with black printing may be placed in your mobile unit's window to identify you as an "Emergency Radio Unit." Card is on a heavy Bristol board stock and is almost identical to those issued to regular emergency vehicles by many agencies. 50¢ each, ppd, or available in bulk amounts of 25 cards for $6.25. Order now from HOT SHOT CARD, c/o CQ's Ham Shop, 14 Vanderventer Ave., Port Washington, L.I., N.Y. 11050.

GRAND RAPIDS AMATEUR RADIO ASSOCIATION presents their 19th annual Amateur Radio Convention, Friday and Saturday, April 21-22, in the Civic Auditorium, Pantlind Hotel, Grand Rapids, Michigan. Write: G.R.A.R.A., Box 1333 Grand Rapids, Michigan 49501.

WRL'S used gear saves money! Guarantee and trial. These low prices without trades: Thor 6 & AC $249.95; G76 $69.95; SR150 $339.95; 753 $159.95; Galaxy V $299.95; Galaxy 300 $169.95; DX100 $89.95; King 500A $184.95; Valiant $149.95; HT37 $239.95; HX10 $249.95; SX101 $159.95. Hundreds more—free list. WRL, Box 919, Council Bluffs, Iowa 51501.

RED or WHITE, die cut Scotchlite letters. Day-Night Visibility. Postpaid/letter, 2"-15¢, 2½"-20¢, 3"-25¢. Portage Industries Inc., Dept. B, Box 188, Portage, Ind. 46368.

POLICE—fire—aircraft—amateur calls on your broadcast radio! Tune the band with TUNAVERTER. Free catalog. Salch Company, Dept. CC, Woodsboro, Texas 78393.

RUBBER ADDRESS STAMP including call letters. Three or four line text $1.50. Signature stamp $2.88. Free catalog. Jackson Stamps, 1433 Winnemac, Chicago, Illinois 60640.

WANTED: Rack mounted HRO coil storage container. J. D. McMechan WØPFP, Route 4, Ames, Iowa 50010.

SALE OR TRADE: KWM2 $685. AC supply $60. Galaxy 3 with AC supply $200. KWM2 Mobile mount $35. C. F. Johnson W5IE, 501 W. Sears, Denison, Tex. 75020.

R-274/FRR Receiver. Needs little bit of work, best offer. Mimeo machine, fair cond. Local only on mimeo. $45. as is. Jim Cooper W2BVE, 834 Palmer Ave., Maywood, N. J. 07607.

R/9 magazines wanted; Nos. 37, 40, 41, 43 to 49, 51, 52, 58 to 73. Also any copies of RADIO, June 1933 to October 1935. F. A. Herridge G3IDG, 96 George Street, Basingstoke, Hampshire, England.

WANTED: Schematic or gear to convert 110 ac, 60 cy to 110 ac, 600-800 cy @ 4 amp to power GP-7 xmtr. Wm. Lindblom, 512 Grandview Ave., Chillicothe, Mo. 64601.

WANTED: Johnson sideband adapter or Heath SB-10. Don Phillips W3JGH, 9722 Jeanes St., Phila., Pa. 19115.

PJ Bandmaster Coas Antenna Traveling Ham's dream. Portable, light broadband quite. Write: Endres Electronic Systems, Mt. Mesa, Lake Isabella, Calif. 93240.

QSLS. Samples 35¢. W8DED Print, Box 218, Holland, Michigan.

SHIELDING Systems, Kits, accessories. Eliminate mobile interference. Estes Engineering, 1639 West 135th, Gardena, Calif. 90249.

DETROIT AREA Annual Swap 'n' Shop; Sunday, April 2, 10 to 4 at K of C. Hall, Grand River Ave. at Lesure. No dealers; just hams!

FREE CATALOG—Loads of Electronic Bargains. R. W. Electronics, Inc., 2244 South Michigan Ave., Chicago, Illinois 60616.

MANUALS for surplus electronics. List 10¢. W3IHD, 4905 Roanne Drive, Washington, D.C. 20021.

6 or 2 meter FM net anyone? 50 watt output DuMont (25-54Mc) complete with everything but antenna, 6/12 volt operation $100. 30 watt output 140-170Mc complete (DuMont 12 volt operation) $100. 6 meter 100 watt output base (DuMont pickup only) $200. Will sell only to hams and not for commercial use. For slight additional cost will put on frequency and install. Bert Simon, Holland Mt. Rd., Oak Ridge, N. J. 07438. (201) 697-4246.

THE ROCKAWAY AMATEUR RADIO CLUB Spring Auction will be held Friday evening April 14th. at 8:00 P.M., at the American Irish Hall, Beach Channel Drive (at Beach 81st St.) Rockaway Beach. Come to the best auction in the New York area. For detailed directions write to P. O. Box 205, Rockaway Park, N. Y. 11694.

WANTED: Broadcast Command Receiver, BC 946 or ARC, no modifications, desire nearly new. Pay good price. W6JXW, 3801 So. A Street, Oxnard, Calif. 93030.

CREATIVE QSL cards. 25¢ for catalog, samples 50¢ coupon. Personal attention. Imaginative new designs. Wilkins Printing, Box 787-3, Atascadero, Calif. 93422.

40 METER Celluloid plug-ins. 75¢. Catalog. Laboratories, 12041-A Sheridan, Garden Grove, Calif. 92640.

FM COMMUNICATIONS Equipment, test equipment, and military electronic equipment. Bought, sold, exchanged. Stamp for list. Newsome Electronics, 2670 Pinetree, Trenton, Michigan 48183.

FCC Commercial operator License preparation by correspondence. Grantham, 1507 N. Western, Hollywood, California 90027.

HAMMARLUND HQ-170A perfect condition, with manual and original carton, $250.00. T. A. Conboy WA7DOX, 1670 Tualatin Street, St. Helens, Oregon 97051.

MATCH BOX 250 with surplus 0-1 mill. sw. & pot. mounted in panel but not in circuit. Trade for SLR camera or gen. cov. rcvr. B. J. Finnell W9UJJ, 4209 N. Ridgeway Avenue, Chicago, Illinois 60618.

CQ, March, April 1945 needed to complete collection. Also any QST's prior to August 1923, reasonably priced. G3IDG, 96 George Street, Basingstoke, Hampshire, England.

FOR SALE: Boehme oiled tape, 15/32" width, P. L. Lemon W6DOU, 3154 Stony Point Road, Santa Rosa, Calif. 95401.

WANTED: Antique Radio Tubes made prior to 1920. Stanley M. La Dage W2EZM, 431 Oakland Avenue, Maple Shade, New Jersey 08052.

HT-33A Mark I for sale, excellent condition, very few hrs. on final, with manual, $250.00 FOB or will deliver 125 mi. All inquiries answered Raymond K. Milligan WA9ABI, P. O. Box 83, Geneva, Ind. 46740.

SAROC Sahara Amateur Radio Operators Convention, January 4, 5, 6, 7, 1968. Hotel Sahara, Las Vegas, Nevada. For details QSL P. O. Box 73, Boulder City, Nevada 89005.

WANTED: Information on Ham Radio Summer Camps or Active Code Classes. Write to: Paul Scroggie, Fishtrap Lake, Sprague, Washington, 99032.

HEATH Two'er w/mike, xtal—$30.00, Hi pwr fixed vacuum cap., Viking II, HQ-140XA, Johnson VFO—all offers answered—213-767-2540. D. R. Etheredge, W6DMP, 12040 Redbank St., Sun Valley, Calif. 91352.

COLLINS 75A3 Sell for $275. with O.B. and 3.1 kc filters, Vernier Knob, homebrew calib and NBFM, prod det per my article Oct 66 CQ. Very clean, perfect operation. C. A. Ebhardt W4HJZ, 22 Rowan St., Raleigh, N. C. 27609.

WANTED—Blank calibration book for BC-221. Also Jan. 61 issue of 73. Sell cheap, 3 KW war surplus 110V 60 cycle generator. J. E. Becker K9WEH, 2435 Birchwood Lane, Wilmette, Illinois 60091.

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You can order 2, 3 or 4 element POLY tri QUAD kits—POLY duo QUAD (15-10) and POLY mono QUAD (10) kits also available. For further specifications plus complete list of kits and individual components, write . . .

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Phone 586-3122

For further information, check number 33, on page 110

WANTED: Want to buy 3-6 mc command receiver, BC 454. C. E. Garrison K4KSU, 15 Calhoun Street, Warrenton, Virginia 22186.

FOR SALE: ASQ-6 mtr. squalo $8.00; DK60-G2C 115vac Dow Key Relay $8.00; 300D Vangard Converter $8.00; CPS Ameco CPO & Monitor $8.00; 100 feet RG-58/U $2.50; Poloroid 80-B $11.00; Stix Borok WB2PFY, 209-25 18th Ave., Bayside, N. Y. 11360. 212-357-4488 after 8 pm.

SALE: R-4, Ameco CN-144 14-18 I.F., AR-22R rotor. All for $275.00 or best offer for each. Richard Bricks, 256 Mt. Lucas Road, Princeton, N. J. 08540.

FOR SALE: Gonset G-50 best offer by March 1st. Write Milt Long WA8LDR, Box 255, Wooster, Ohio 44691.

SELL: Swan 240 Transceiver—DC power supply Hustler Mast—75, 40, 20 resonators—Turner Mike dash mount—stainless antenna mount—$275.00. Dr. M. D. Solomon K2MYW, 41 Westbrook Lane, Roosevelt, L. I., N. Y. 11575.

SELL: SSB Xctr Jan 1963 QST less filter. Needs work $120.00 worth new parts. No junk. Best cash offer. Might trade for needed used gear. All SASE answered. D. A. Grant W2DY, 8 Plymouth Rd., Hauppauge, L. I., N. Y. 11788.

WANTED: BD-77 Dynamotor. Any type Teletype Equipment to get started in RTTY. H. Turner W4EIV, 124 Manning Dr., Charlotte, N. C. 28209.

FOR SALE: Globe Hi-Bander 6&2 phone & C.W. Transmitter 50 Watts. EICO model 730 Modulator. Make offer. David Hirsch WB2QNG, 36 Fairchild Place, Whippany, N. J. 07981.

SALE or TRADE: BC-221-0 Metal case. Reg. P.S. Cal book & Manual. $75.00. Want ARR-15. T. A. Herrmann W7AOI, 2327 S.E. 72nd Ave., Portland, Oregon 97215.

FOR SALE: BC-453 with 115 vac PS; Heath 2er and 12V DC PS; Misc. meter TS-173 UR. J. I. Leskinen W2RUZ, 33-45 172 St., Flushing, N. Y. 11358.

FOR SALE: Hickok model 288X crystal controlled signal generator. Covers 100 KC to 160 MC and 0 to 15 KC AF. With 10 to =38 DB meter. $50.00 sent REA. Bill Gode WA9NHQ, 1036 Hillside Rd., Northbrook, Ill. 60062.

WANTED: Your old Antique receiving and transmitting vacuum tubes with brass bases for private ham collection. R. W. Schnedorf, W9LGH, 610 Monroe Avenue, River Forest, Illinois 60305.

HW-12, HP-13 DC Supply, Shure 201 Mike, speaker, Hustler 75 mtr resonator, all guaranteed. $150.00 postpaid. Carroll G. Welker WA3GQQ, 151 Kimber Drive, Bridgeville, Pa. 15017.

WANTED: Ameco 220Mc converter 28 Mc IF reasonable. For sale, APT-5 w/man $40.00. Heavy prefer local. A. S. Johnson K7VQI/W6EPO, 229 Lindell Avenue, El Cajon, Ca. 92020.

WANTED: To buy SSB Transceiver—Swan, SBE, National, Halli. With or Without P.S. Cash for right offer. Contact me evenings at 212-762-2570. Pete Ludwig, 34-15 Parsons Blvd., Flushing, L. I., N. Y. 11354.

WANTED: Motorola P-8464 pwr supply (110vac60watt) for 80-D base station, for cash or swap new Model 28 Trans-Dist (LCXD) Will answer letters if you send stamp. J. Thomsen W9YVP, 11001 S. Pulaski Rd., Chicago, Ill. 60655.

WANTED: Collins Mechanical Filters (500 B-08-526-9007-00) (500B-14-526-9030-00) (500B-31-526-9008-00) (500B-60-526-9009-00) C. F. Albertoni K8JBE, 1410 Brookwood Dr., Suffield, Ohio 44261.

SSB-CW-AM Xmtr Viking 2, VFO, B & W 51SB-B, PTT, VOX. Also provision to power & mod. a 6N2 or similar VHF rig. Price on request. Rich, Greenberg WA2CSE, 55 Bulson Rd., Rockville Ctr., L. I., N. Y. 11570. 516-678-1523.

FOR SALE: Skyland 2 element 10, 15, 20 meter Quad with steel boom 5 mo. old. $75.00. will ship. R. Marsino W2UGM, 66 Columbus Ave., Closter, N. J. 07624. 201-768-1884.

WANTED: 16MM sound films on Basil Electronics for Van Wert Amateur Radio Club, Inc. Buy or Donate. J. H. Feldwisch K8LMN, RR1, Mendon, Ohio 45862.

WANTED: Linear amplifier using 4-1000A or 4CX1000A without tubes. Tabletop preferred. In good working order. Write price and weight to T. F. Keim VE8AH, P. O. Box 1123, Inuvik NWT, Canada.

NOVICES—Am QRO. Must sell A-1 cond. Conar 400 Xmtr, $25.00. M. Gosnell WN2WVY, 11 Orchard Circle, Suffern, N. Y. 10901.

W0CVU on the air since 1913. A member of ARRL for 50 years. Look for me on SSB 14,275 KC. Chas. W. Boegel W0CVU, 1500 Center Pt Rd NE. Cedar Rapids, Iowa 52402.

SWAP 5" Knight oscilloscope for receiver or other Ham gear. Tom Dornback K9MKX/19W167, 21st Place, Lombard, Illinois 60148.

DRAKE 2A mint $150.00, 2AQ $20.00, 2AC $5.00. All $170.00. Factory reconditioned 1966. Original Box. Perfect Apache $110.00. J. B. Kennerdell WB2UTJ, 220 Forest Orchard Park, N. Y. 14127.

FOR SALE: New BC45, $8.00; 6&2 mtr trans 20W with modulator $30.00; HE 50 ten mobile, VFO, crystals, mike $40.00; Cushcraft stacked Halo $10.00. Charles Copp W2ZSD, 6 Northfield Lane, Westbury, L. I., N. Y. 11590.

ANTENNA: Super Broadband Double "Z" Quad—40, 20, 15, 10 Meters—Low cost—Light weight—"Boomless" High gain Design. Plans $3.00 PP. WB6OHK, Astro-Beam, Dept. C., 1749 Dorothea, Visalia, Calif.

"TRANSVERTERS" Hallicrafters HA-2, HA-6 and P-26 power supply. Used only few hours in perfect condition best offer over $200. W4CYE, 1724 Center St., Holly Hill, Florida.

DXpeditions—You supply cards and logs and I'll quill work. R. G. Beaudet W1YRC, 2 Rocky Crest Rd., Cumberland, R. I. 02864.

WANTED: Coil strip for R-25/ARC-5 command receiver, tunes 1.5 to 3 mcs. J. Lincoln K1NQI, 12 Crestview Terrace, Wallingford, Conn. 06492.

75A4 #2818 with 0.5 and 3.1 kc filters and speaker, $375.00; Heath Marauder, $190.00; Both excellent operating condx. Edward Rebennack WA5EID, 386 Tudor Ave., New Orleans, La. 70123.

PROJECTION Television components wanted. Need optic systems and projection tubes. State price and condition. J. Krizsan K8YVJ, 2519 Ashurst, Cleveland, Ohio. 44118.

TOROIDS, 44 or 88mh, any 5/$2.00, Polar Relay $2.30, Relay Socket 70¢, all p.p. USA. E. W. Evans K4OEN, 220 Mimosa Lane, Paducah, Ky. 42001.

B & W Matchmaster (unused) power meter S.W.R. & Watts output to 125 watts. Good thru 11 meters. ¼ orig. cost. $20.00. Harold D. Mohr K8ZHZ, 5670 Taylor Rd., Gahanna, Ohio 43020

FOR SALE: Hallicrafters Model SX 99 receiver. Old but little used because of illness. Price $99.00. This receiver is at present in Penn State, Pa. Write me for address where it can be seen. F. B. Phillips W3LIK, R.D. 2 box 331, Sharon, Pa. 16146.

DEPTH SOUNDER for sale. Heathkit model M1-11. Wired, new. $60.00 C. P. Baldwin W1EFF, 1938 Pownal Rd., Gray, Maine 04039.

OLD TIMERS NIGHT—April 20, 1967 at 8:00 P.M. to be held at the Egyptian Radio Club, Inc., W9AIU, Located near Granite City, Illinois. All hams welcome. Don't miss this evening of entertainment. Refreshments. No Admission.

TEST EQUIPMENT Data Handbooks (Military) for sale. Volumes one, two, three, four. Frederick Research Corp. 1961 Publication . . . Four new bound books . . . $5.50 postpaid, payment with order RITCO, Box 156, Annandale, Virginia.

FACTORY wired Ameco 6m and 2m converter, $25. each or $50 for both with power supply included, D. Sunday W8ABX, R#3 Box 8, Three Rivers, Mich. 49093.

COMPLETE 275 wts station, Viking Valiant, HQ 170C ES Dow Key Relay $325.00. All mint Henry Wroblewski WA9AAQ, 3747 S. Harvey Ave., Berwyn, Illinois 60402.

DRAKE 2A with Q-multiplier and speaker, and Xtal Calibrator $200.00. Hammarlund HX-50 $250.00, both in excellent cond. D. Deatrick WA8OLD, 2940 Hickory Lane, Ann Arbor, Mich. 48103.

SX-140 receiver good condition. 80 meters thru 6 meters, asking $65. or equal value in trade. What have you? K. Birmingham WB2IFC, 413 Holmes Drive, Burlington, N. J. 08016.

HEATH Receiver GR91-.55-30mc and Alliance Rotator U 98 for sale or trade. Make offer. Sanford Mathis K0TVX, RR 4, Paola, Kans. 66071.

LAFAYETTE KT-320 + spkr —$60.00. Globe Scout 65A (slightly modified) $45.00. Both work, with manuals and shipping prepaid (USA) W. K. Brown WB2ULS, 53930 Baker Rd, Orchard Park, N. Y. 14127.

SELL: 100 mfd 3,500 vdc GE Pyranol capacitors 4 x 8 x 14 inches. New. $40. fob. Rev. P. E. Bittner W0AIH, 814 4th St. South, Virginia, Minn. 55792.

NOVICE STATION—NC-140 Homebrew 80, 40, 15M. 30W. xmtr; 40M. dipole and coax; Excel. cond. $125.00. Will ship. Harry Woodworth WA3CVQ, Box 105, Jamestown, Pa. 16134.

WANTED: 20 meter AM or SSB rig, 20 meter beam. Sell: NC-190 orig. car., cost over $200., sell for $125. or best offer. M. I. Neidich, 18 Wendy Lane, E. Northport, L. I., N. Y. 11731. 516-368-8525.

COLLINS TCS xmtr, rcvr, 115AC P.S., manuals, etc., for complete station. Unmodified, excellent cond. $65.00. Pick-up only. Rev. Charles T. Urban K3IVI, 1815 So. 27th Street, Phila., Pa. 19145.

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FOR SALE: Ham Scan HO-13. New condition built for 455 IF. Manual. Inquiries answered. $45. A. H. Davis W5DPI, P. O. Box 831, Borger, Texas 79007.

WANTED: A pair of 4-400 or 3-400's, or one 3-1000 or 4-1000 for a linear. Tom Frenaye, WB6KIL, 617 Purdue Drive, Claremont, Calif. 91711.

FOR SALE: H-3 wench for Triastao Tower, clamps on rung. $10. Linear amplifier, 6146's with pwr sup. "Old reliable"' $40. E. H. Marriner W6BLZ, 528 Colima Street, La Jolla, Calif. 92037.

TELETYPE Reperferator Model 14, (TT-53/FG in excellent condition, complete with end of line indicator $45. or make offer. Larry Loper W4WHF, 255 Suntan Avenue, Sarasota, Fla. 33577.

MAGNECORD model 1024 professional stereo recorder. Will swap for Drake T4X W/ps. or 60 ft. crank up tower. F. E. Winters, 5735 E. 27th St., Tulsa, Oka. 74114.

EICO 753 transceiver and National NCX power supply, two months old in excellent condition, $239.00 Phil Gluckman WN6SSA, 19790 Merribrook Drive, Saratoga, Calif. 95070.

FOR SALE: Drake 2B/2BQ $185. Ranger I $75. All excellent. Will trade for transceiver with CIW. provisions. R. F. Cann W4GBB, 815 Ben Franklin Dr., Sarasota, Fla. 33577.

WANTED: Bell T-300 series tape transport with or without Preamps 2 or 4 track model. J. M. Trutko W8EXI, 2530 Sackett Ave., Cuyahoga Falls, Ohio 44223.

WANTED: Drake RC-3 remote VFO. Quote price F.O.B. my QTH. E. K. Snider K6TST, 4090 Sunset Lane, Pebble Beach, Calif. 93953.

FOR SALE: R 390, Invader 2000 Valiant, ARR.7, Tapetone rcvr. Harvey Wells TBS50D, sheet available. Make offer. J. Thomas, 11 Sussex St. N., Lindsay, Ont. Can.

WANTED: Coils for Collins 30K-4 transmitter, 275 watt Johnson Matchbox with meter, Heath Two'er. Col. O. A. Heinleen W7BIF, 107 Wyoming St., Boulder City, Nev. 89005.

FOR SALE: New R.C.L. 1/10% Precision Resistors. 10K and 3K values for $1.00 each and self-addressed stamped envelope. A Lewis K4GGC, Box 100, Humboldt, Tenn. 38343.

RELAYS—W E 275B/Clare HG1017 @ $3; P & B KRP1660-3 SPST @ $3; XFMR-UTC S-50 @ $30; W. E. Headset 52-B coil cord, new $15. tubes—829B @ $4; 4D32 @ $10; FOB E. F. Lankford W4HHY, 511 Purnell Dr., Nashville, Tenn. 37211.

WANTED: B & W 852 or FC-30A. Rod Linkous W7YBX, 5632 47th Ave. S.W., Seattle, Washington 98116.

FOR SALE: One pair of new 4-125A's only $15.00, postpaid. H. B. Smith W8VVD, 467 Park Ave., Birmingham, Mich. 48009.

EXCELLENT 40 meter 200 watt SSB transceiver HW22 w/calibrator $80.00. One owner. Power supplies available. Ben Ball WA5MJB, 5051 Yarwell, Houston, Texas 77035.

WANTED: VHF-UHF Sig. Gen. TS47A/ARP 40-500 mc also good lab. type scope. Art Pfalzer K8WNT, 240 Beechwood Dr., Granville, Ohio 43023.

SWAN 350: Latest, mint, 117C-P.S. 500W-CW/AM Xmtr, my surplus equipment, parts, magazines. Bargains. G. S. Beck W2CE, 55 E. Bedell St., Freeport, N.Y. 11520. 516-FR 9-0415.

ATTENTION TA-33 owners—TA 40KR 40 meter kit for sale, $30. M. C. Pogue W2CEI, 45 Cavell Pl., W. Caldwell, N. J. 07006.

CLEANING out mostly VHF-UHF equipment, vacuum variables, etc. List for stamp. C. E. Spitz W4API, 1420 S. Randolph St., Arlington, Va. 22204.

COMPLETE STATION. Valiant 1/FW exc. condx., HQ-140 w/speaker, Q mult. and xtal calibrator. All for $245. Will deliver 50 miles. R. Kovarcik WB2CRX, 16 Lizette St., Garfield, N. J. 07026. Phone 201-256-7832.

WANTED: Operating manual and circuit diagram of the LYSCO Transmaster transmitter. Give price wanted. All replies answered. A. G. Sayre W9MG, P. O. Box 244, Milton, Wisc. 53563.

SELL: CQ's from 45. QST's from 17. Callbooks from 21 and other radio magazines. Erv Rasmussen, 164 Lowell, Redwood City, Calif. 94062.

WANTED: Code practice records for beginners and advanced trade. for new parts. Write G. H. Lee W6IOW, 1246 Manhattan Beach Bl. Manhattan Beach, Calif. 90266.

WANTED: DX-100 that needs work. Stan Zuchora W8QKU, 2748 Meade St., Detroit, Mich. 48212.

FOR SALE: QST's 1929 through 1963. CQ's 1953 through 1963. Sell by groups or individual copies. C. C. Caves W6ERC, Box 1, La Crescenta, Calif. 91014.

BC-221-P with orig. book $40. TS-175/U, book & manual $65. W.U. Model 105 Teleprinter $35. Want good gen. coverage receiver & Heath 2'er. L. W. Amundson K0OSL, 465 18th Avenue No., E. Grand Forks, Minn. 56721.

REMODELING—space problems SX101 $139., Senaca $139, BC-1031-C $58. SASE on others. FOB Henry Miller WA6CFD, 155 Via Los Miradores, Redondo Beach, Cal. 90277.

WANTED: AN/URC-4 walkie talkie not converted or modified in any way. In good used condition. J. E. Carr WA4FCC, Rte. 2, Rockmart, Ga. 30153.

CANADIANS: Collins F455J15 mechanical filter $35. Argonne double xtal, mic. model AR57 $10. Heath QFI $8. Heath IT10 $8. Hart VE3TA, Box 29, RR1, King City, Ont., Canada.

HOUSTON Area—wanted; Clean KW Johnson matchbox. W. Fulton, WA5CXT, 6323 Newquay, Houston, Texas 77045.

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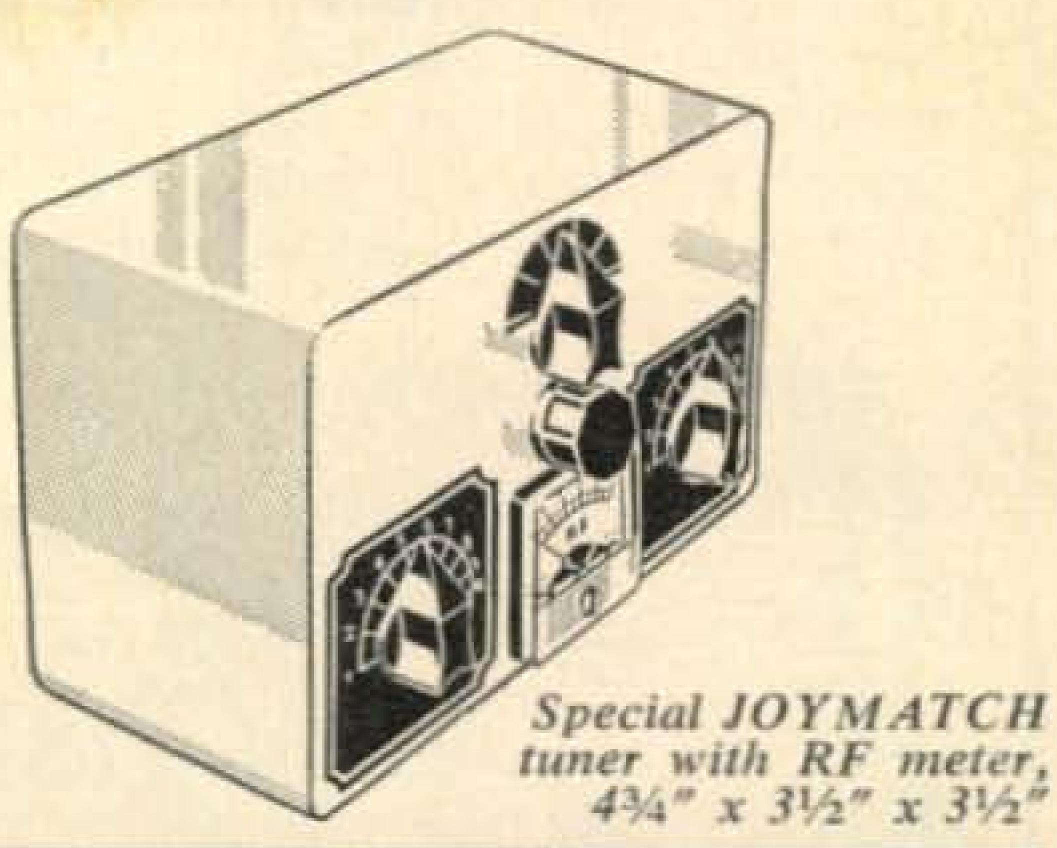

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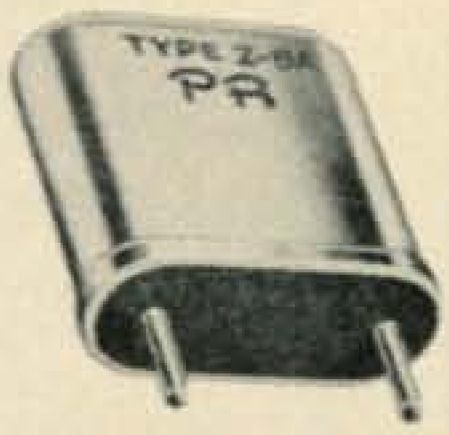

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10/15/20 CUBICAL QUAD SPECIFICATIONS

Antenna Designation: 10/15/20 Quad
Number of Elements: Two. A full wavelength driven element and reflector for each band.
Freq. Covered: 14-14.4 Mc. 21-21.45 Mc. 28-29.7 Mc.
Shipping Weight: 28 lbs. Net Weight: 25 lbs.
Dimensions: About 16′ square.
Power Rating: 5 KW.
Operation Mode: All
SWR: 1.05:1 at resonance
Gain: 8.1 db. over isotropic
F/B Ratio: A minimum of 17 db. F/B
Boom: 10′ long x 1¼″ O.D.; 18 gauge steel; double plated; gold color
Beam Mount: Square aluminum alloy plate incorporating four steel U-bolt assemblies. Will easily support 100 lbs. Universal polarization.
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X Frameworks: Each framework consists of two 12′ sections of 1″ OD aluminum 'hi-strength' (Revere) tubing, with telescoping ⅞″ tubing and short section of dowel. Plated hose clamps tighten down on telescoping sections.
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Now check these startling prices—note that they are *much lower* than even the bamboo-type:

10-15-20 CUBICAL QUAD	$35.00
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3 EL 20	22*	7 EL 10	32*
4 EL 20	32*	4 EL 6	15
2 EL 15	12	8 EL 6	28*
3 EL 15	16	12 EL 2	25*
4 EL 15	25*	*20′ boom	
5 EL 15	28*		

ALL-BAND VERTICALS

"All band vertical!" asked one skeptic. "Twenty meters is murder these days. Let's see you make a contact on twenty meter phone with low power!" So K4KXR switched to twenty, using a V80 antenna and 35 watts AM. Here is a small portion of the stations he worked: VE3FAZ, T12FGS, W5KYJ, W1WOZ, W2-ODH, WA3DJT, WB2FCB, W2YHH, VE3-FOB, WA8CZE, K1SYB, K2RDJ, K1MVV, K8HGY, K3UTL, W8QJC, WA2LVE, YS1-MAM, WA8ATS, K2PGS, W2QJP, W4JWJ, K2PSK, WA8CGA, WB2KWY, W2IWJ, VE3-KT, Moral: It's the antenna that counts!

FLASH! Switched to 15 c.w. and worked KZ5-IKN, KZ5OWN, HC1LC, PY5ASN, FG7XT, XE2I, KP4AQL, SM5BGK, G2AOB, YV5-CLK, OZ4H, and over a thousand other stations!

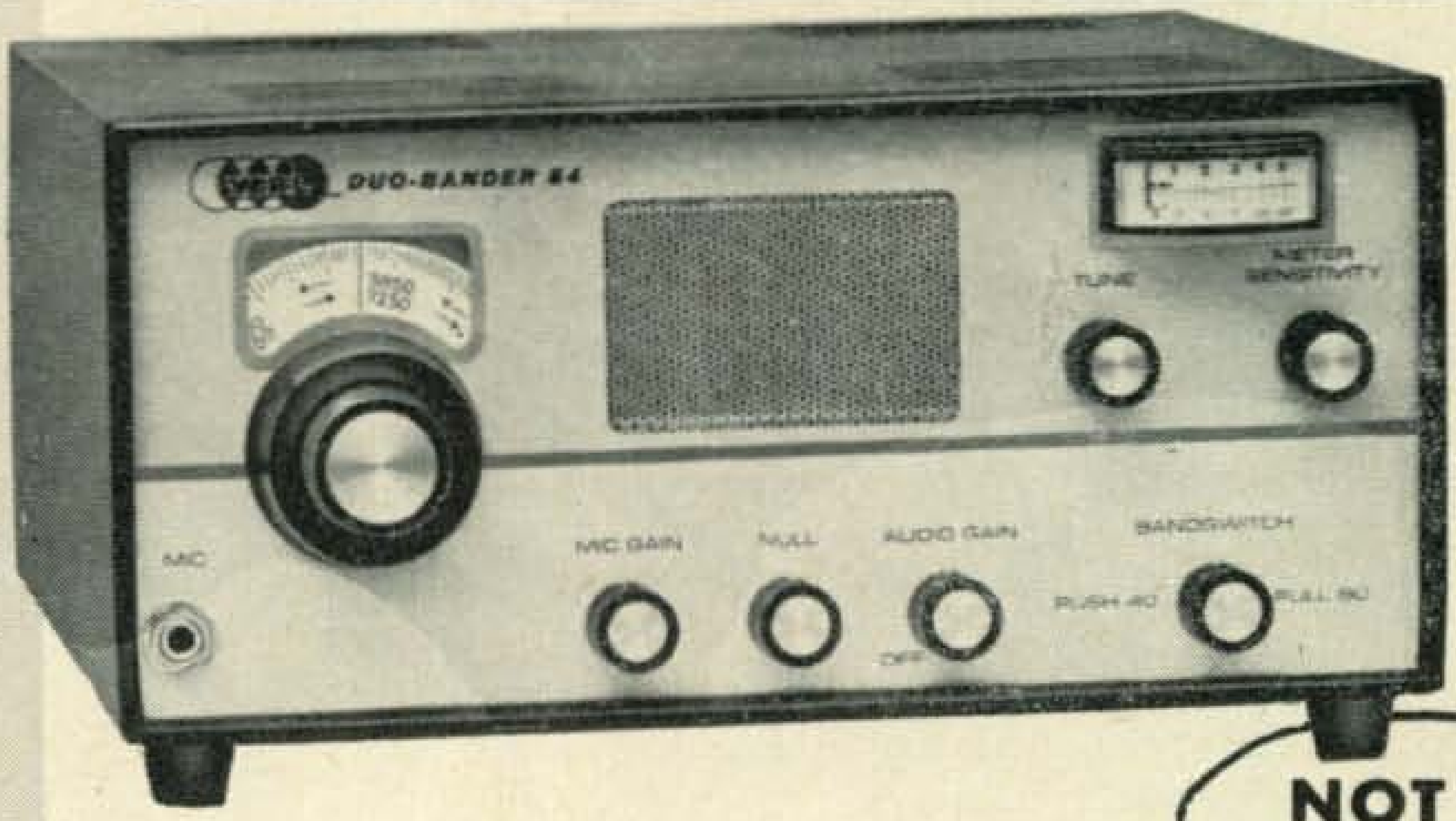
V40 vertical for 40, 20, 15, 10, 6 meters	$14.95
V80 vertical for 80, 75, 40, 20, 15, 10, 6 meters	$16.95
V160 vertical for 160, 80, 75, 40, 20, 15, 10, 6 meters	$18.95

HOW TO ORDER: SEND CHECK OR MONEY ORDER. WE SHIP IMMEDIATELY UPON RECEIPT OF ORDER BY RAILWAY EXPRESS, SHIPPING CHARGES COLLECT.

GOTHAM, 1805 Purdy, Dept. CQ, Miami Beach, Fla. 33139

For further information, check number 20, on page 110

"Just found out how much I could have SAVED by buying a WRL Duo-Bander 84!"



NOT A KIT!

WIRED — Ready for Operation

Designed for the Amateur who's interest is 80 and 40 meter SSB. Power and high-performance at a very reasonable cost! Power to make good contacts...a selective Receiver, Stability and Compactness! (5x11¼x10") Smaller by far than anything in its power class!

LOOK AT THESE FEATURES: 300 Watts PEP/SSB • 2 Kc Dial Calibration • Rugged Reliable Printed Circuitry • Stable-Transistor VFO • Dual-Speed Vernier VFO Tuning • Built-in Speaker • Mounting Bracket • Combination "S" Meter and Output Meter • Sharp 4-Crystal Lattice Filter.

$159.95

Why wait? Enjoy it now for only $8.00 monthly!

THREE Great Package Options!

ECONOMY FIXED STATION PACKAGE

INCLUDES

DUO-BANDER 84
AC48 Power Supply

$199.95 10 DOLLARS MONTHLY

FIXED STATION PACKAGE

INCLUDES: WRL Duo-Bander 84; Model AC-384 Power Supply; WRL 3N1 Mike w/stand; WRL 80-40 Meter Doublet; (100') RG58/U Coax; All plugs.

$265.00 14 DOLLARS MONTHLY

MOBILE PACKAGE

INCLUDES: WRL Duo-Bander 84; DC Power Supply with cables; WRL 3N1 Mike; Body Mount; New-Tronics RSS2 Spring; MO-1 Mast and 40 & 80 Resonators; (25 ft.) RG58/U Coax; all plugs.

$305.00 15 DOLLARS MONTHLY

"The House the HAMS Built!"

CQ-16N

WORLD RADIO LABORATORIES
3415 West Broadway, Council Bluffs, Iowa 51501

Please ship me the following:

☐ Duo-Bander 84 – $159.95 ☐ Free 1967 Catalog
☐ Information on Duo-Bander 84
☐ Economy Fixed Station Pkg. – $199.95
☐ Fixed Station Package – $265.00
☐ Mobile Package – $305.00
☐ Check or Money Order Attached ☐ Charge it.

Name__________ Call__________

Address__________

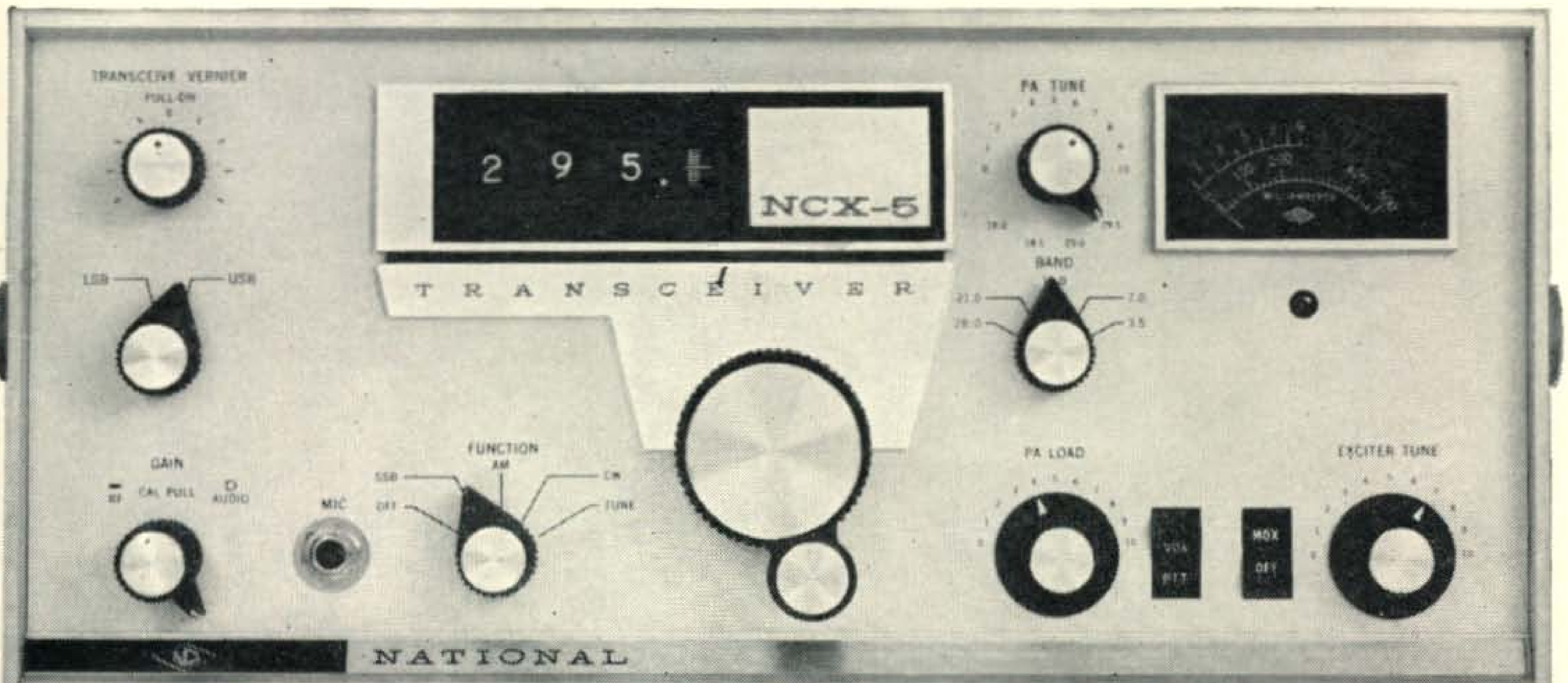
City__________ State_____ Zip_____

For further information, check number 16, on page 110

The world's finest 5-band transceiver

NATIONAL'S NEW 1967 NCX-5...$549

The only change is the price!


TRANSCEIVE VERNIER
PULL ON
USB
LSB
GAIN
RF
CAL PULL
AUDIO
MIC
FUNCTION
SSB
OFF
AM
CW
TUNE
2 9 5 .
NCX-5
TRANSCEIVER
PA TUNE
BAND
21.0
28.0
7.0
3.5
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You can pay much more, but you'll never find another 5-band transceiver to match National's top-quality NCX-5. Here are the features and performance figures that have made the NCX-5 the most wanted transceiver on the market: ■ Amazing frequency stability . . . virtually no warm-up drift ■ Incomparable selectivity . . . 8-pole high-frequency lattice filter exhibits a 1.7:1 shape factor ■ Two RF stages in receiver section for matchless sensitivity ■ Transceive Vernier control for 5 kHz of receiver offset ■ Digital counter read-out accurate to 1 kHz on each band with additional counter calibration to 100 cycles ■ Conservative 200 Watts PEP rating ■ Fast attack-slow decay AGC ■ S-meter ■ Full VOX or PTT operation ■ Break-in CW keying with adjustable release time ■ ALC and external ALC input for use with the NCL-2000 linear amplifier ■ Mobile mount included. See the NCX-5 at your National dealer's today. Enjoy National quality . . . National features . . . National's full One Year Warranty . . . at National's 1967 price . . . only $549.

National Radio Company, Inc.
37 Washington Street, Melrose, Massachusetts 02176

For further information check number 45 on page 110

More power

RCA 6146B/8298A Beam Power Tube Plus Simple Modification Increases Output Over 10%

10 E H
17 D
62 wA

RCA Engineering Note

POWER TUBE

MORE POWER WITH RCA-6146B/8298A
by modifying existing circuits using 6146, 6146A, or 8298

Step 2: Meter dc plate voltage, dc plate current, bulb temperature, and, if possible, the power output of the amplifier to assure that the maximum ratings of DC Plate Current, Plate Input, Plate Dissipation, and Bulb Temperature are not exceeded in making adjustments described in succeeding steps.

Step 3: Increase the coupling between the amplifier output tank circuit and the transmission line to the antenna or load. (Instruction manuals usually describe this procedure.) In many cases where sufficient driving reserve is available, this change

IEN-3

RCA-6146A
BEAM POWER TUBE

RCA-6146B/8298A
BEAM POWER TUBE

TYPICAL OPERATING DATA
as ICAS Class C Telegraphy
Amplifier at 60MHz

	6146A	6146B/829
DC Plate Voltage	750	750
DC Grid #2 Voltage	160	200
DC Plate current	120 ma	160 m
Power Output (ICAS Approx.)	70 W	85 W

Here from RCA—developer of the famous 6146—is t information you need to increase your rig's output. full details on simple modification—or direct replacement—to take full advantage of the added 6146B/8298A capabilities, write RCA Commercial Engineering, Section D15-M, Harrison, New Jersey 07 for your free copies of Engineering Note IEN-3 and product data sheets on the RCA 6146A and 6146B/8

RCA Electronic Components and Devices

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